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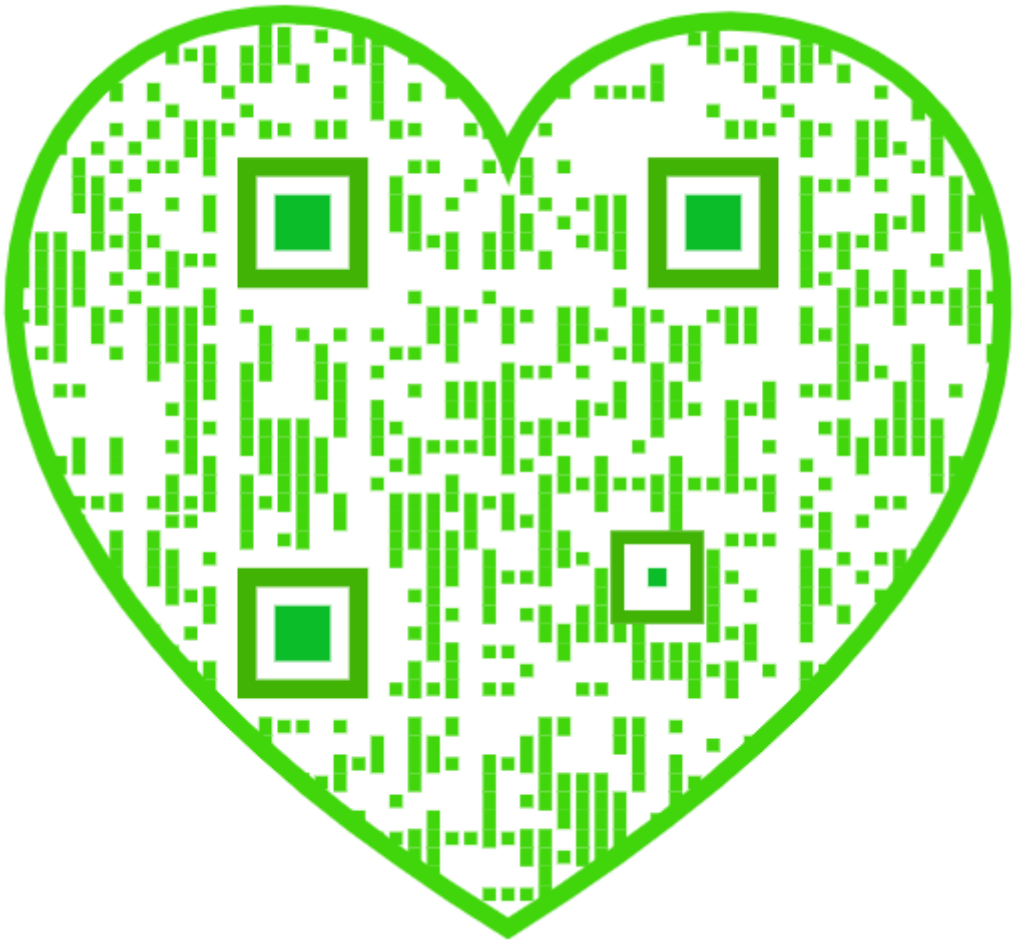

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HELPS FOR

UNGRADED SCHOOLS.

A MANUAL FOR THE USE OF

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PREFACE.

The special characteristic of the common-school education of to-day is object teaching, a declaration of independence, in a marked degree, of the text-book, a frequent substitution of things that can be handled for the printed forms which merely represent those things. Hence it happens that very few teachers in this generation are content to use books alone. Most of them require objects in addition to the text-books. As soon as the rule is established in any school that objects must be studied as well as books a demand is created for material properly prepared for systematic use. But it is not always an easy matter for the teacher to know where to get this material, or how to use it to advantage.

As manufacturers of school aids and material which has been accepted and adopted all over the Union and in various foreign lands, having many years of experience in the business and being in constant receipt of practical suggestions from progressive teachers, it has occurred to the publishers that "A Manual for the Teachers of Ungraded Schools," telling how to use this material, must be widely welcomed.

In thus dedicating this work we do not assume that such teachers lack native intelligence, or education, or aptness for their work, or that they are necessarily behind the times. It is always the teacher who makes the school, not the superintendent, school-board, school-house, furniture or appliances. President Garfield said that for him it "would be a university to sit on a log with Mark Hopkins at the other end." And there are many successful workers in paths that never have and never will be "graded."

We do maintain, however, that the teacher of the ungraded school has more to contend against from one year's end to the other than the average teacher under the graded system. She often feels herself to be "completely in the dark" concerning the theories and methods of what is called the "new education." Being located, it may be, at a distance from all schools that are graded, compelled, perhaps, to work month after month without intelligent supervision or helpful suggestions from anybody, deprived of the thousand and one useful appliances which do so much to make the city school-room attractive, seldom allowed to attend a gathering of fellow-teachers or visit other schools, it is not strange that such teachers often find their lot a discouraging one.

At least four departments of instruction are being carried on simultaneously in the lowest grades of our best primary schools, Language Work, Form Study, the Teaching of Color and Number Work. Each of them should be given an important place in the ungraded school, and for this reason they will be defined and explained in detail in the following pages.

While they cannot be treated simultaneously on paper the reader should remember that in the school-room they go on together, hand in hand, neither preceding nor following one another.

These departments do not of themselves make a school course. They prepare the way for Drawing, Geography, History, Physiology, Elementary Science, Physical and Manual Training, and, in fact, lay the foundation for all education, no matter how extended. It is the province of this book to treat of as many of these branches as seem to be within reach of the ungraded school and that require the use of material for studying them to the best advantage. The different studies and kinds of material treated are classified throughout the work under such general names as pass current with modern educators, and near the end mention is also made of various books which will prove helpful to almost any teacher studying them aright.

That very many things are attempted in the primary grades of the city schools, compared with the old-fashioned methods of fifty years ago, when Webster's "blue-back" speller reigned without a peer as the text-book for primary education, is apparent to the most casual observer. These things are generally rated as "Busy Work," evidently out of deference to the idea that a certain low-caste individual always "finds some mischief still" for the idle fingers of both big and little people. It is not mere activity, however, which the teacher wishes to encourage, but occupation with development. Therefore in commending a series of school occupations it should be possible to show that they have some logical relation to each other. Such a relation is claimed for the occupations employing the material which we propose to describe. It is not expected that every teacher who reads these pages will undertake to give instruction in all the branches or to use every kind of material mentioned here. The publishers have simply aimed to present a comprehensive scheme from which each teacher can choose much that is adapted to his or her particular flock.

Teachers often find it necessary in introducing material into their schools to pay the first cost themselves, and they sometimes feel that such a tax on their purses is unjust and that school boards are very heartless in not allowing them some little latitude in such matters. But experience teaches, in a majority of cases, that if they will be content to advance a small investment in the right kind of material and then patiently work out with that material results which are worth showing the committee, the latter will be glad to approve the bill for a second order in the same line. The correct use of such material is just as much a process of education in the teacher, and parents and the school official, as it is in the children.

The kindergarten has furnished many suggestions to the most sucessful primary teachers now on the stage, and a good many of its occupations, often in a modified form, have found their way into the primary school-room.

Although the primary school cannot be a kindergarten every teacher who has been so fortunate as to take a kindergarten course finds it of unquestioned benefit in all her school work. And yet no one need wait for a technical understanding of the kindergarten course before venturing to use any or all of the material described here. A considerable part of it owes its origin to some bright teacher fond of experimenting with home-made apparatus, who has in time become convinced that his or her appliance is worthy of a broad public recognition and has persuaded us into accepting that opinion, and the directions for using all of it will, we trust, be found exceedingly explicit and easily understood.

Neither should a teacher wishing to know more about the kindergarten than she has yet been able to learn despair of the task, because there are no opportunities at hand for taking the regular course. By ordering the material from the Kindergarten Catalogue, a little at a time if need be, and a careful study of such books as "The Kindergarten and the School," "Paradise of Childhood," and other similar works, a very considerable knowledge of the system can be gained. It is like studying a foreign language by yourself; creditable progress can be made, but the help of a teacher is desirable when such help can be secured.

This little book only claims to be a compilation from all available sources of such descriptive matter as will help the teachers of ungraded schools to handle to the best advantage the material of which it treats. The compilers have endeavored to give liberal credit all along through its pages to those teachers and educational writers from whom ideas have been borrowed, and they desire particularly to thank the friends not herein mentioned by name who have aided them in the preparation of the manuscript.

Even as a compilation the book is incomplete, at its best. As has already been hinted, much space might have been given to the things which are most talked about in the teachers' conventions of the day, Manual Training, Cooking, Sewing, the teaching of Natural and Physical Science, etc. All these things are of the first importance when considered as a part of the American educational system, but they are not the most essential branches to be taken in hand, during school hours by the average pupil in an ungraded school. Almost every boy in such a school undertakes a course of his own in "jack knife work" and few of the girls lack some practice in cooking and sewing, while there are always abundant opportunities for investigating the hidden facts of elementary science, without the aid of special apparatus, if the teacher is alert to embrace them. Consequently much has been omitted that might have found a place here, under other conditions, and many themes and methods have been merely hinted at which the progressive teacher may be glad to pursue beyond the outline imperfectly sketched on these pages.

CONTENTS.

Chapter.		Page.
I.	Language Work.	9
II.	The Beginning of Form Study	13
III.	Clay Modeling	20
IV.	Devices For Teaching Form	23
V.	The Teaching of Color	27
VI.	Stick Laying	31
VII.	Card-board Sewing	35
VIII.	Paper Weaving	41
IX.	Paper Folding	49
X.	Paper Cutting	53
XI.	Drawing and Drawing Implements . . .	56
XII.	Number Work	66
XIII.	Time and Money	74
XIV.	The Teaching of Fractions	82
XV.	Weights, Measures and Mensuration . . .	86
XVI.	Geography	91
XVII.	Physiology	94
XVIII.	Physical Training	98
XIX.	Concerning the Kindergarten	103

CHAPTER I.

LANGUAGE WORK.

An expert writer on primary education lays down this bit of philosophy in a book for teachers recently published: "During the first years of school life the subjects of study should be of a character to facilitate the formation of perceptions and their transition into conceptions. They should lie on the side of the concrete, the actual, the outer, they should deal with facts, with space, with objects. They should gradually merge into forms that lie on the side of the abstract, the possible, the inner, that deal with principles, with laws, with time, steadily leading the child out of the complexity of things into the simplicity of thought."

These words neatly present, in a nut-shell, the argument for object teaching in the youngest classes and the same idea is often condensed into the motto "From the Concrete to the Abstract" by apostles of the New Education. This motto pertains both to the order in which different studies should be taken up by little children and also to the methods to be pursued in teaching those studies.

Language Work is naturally the first department to be considered in a general scheme for common-school education. It may be defined as any school occupation intended to secure an intelligent expression of ideas, whether that occupation be the simplest talk between the teacher and the children about their reading lesson before they begin it, or the analytical study of English or classical literature by the most advanced pupils. Language work certainly includes Reading, Writing and Spelling, together with what has so long been called the study of grammar, and is of the first importance in the ungraded school.

But language work in its beginnings must progress from the concrete toward the abstract. The youthful mind is most intent on those things which can be seen and handled, therefore the little child should first be taught to read the names of familiar objects. Again the youthful mind finds it easier to deal first with wholes and then to separate those wholes into parts than to begin with fragments and construct wholes from them. He would be rated a poor teacher who should undertake to fix the idea of an apple in the mind of a child who had never seen one by first showing him a quarter of an apple and then, after adding each of the other three-quarters in succession, present the four as a whole apple. But how much better is the plan of teaching the child a whole word by making him learn the letters in it and how to put them together before he knows what idea

the word represents? When he grasps the word it will mean something to him, if it is the name of some familiar object or action, but the letters are without meaning.

Accepting these principles the best primary instructors of our day take objects with which the children are most familiar as the texts for their first reading lessons and then teach whole words, and even short sentences, before paying any attention to the Alphabet. Of course by so doing they revolutionize the long-accepted primary methods and put the teaching of spelling after that of reading, instead of before it.

Another popular innovation is the simultaneous teaching of script words and sentences with that of those printed in ordinary type, so that the pupil learns to read plain writing as early and as well as he can printed matter. Indeed some teachers claim that he should not be taught any printed words until he has mastered the reading of simple script sentences, and that then the transition from one form to the other can easily be made in one or two lessons. They never encourage him to copy the printed forms of words, as was formerly done, but let him begin to write words and sentences as soon as he understands what they mean.

That there is a wide difference of opinion among progressive educators respecting the best methods of primary language work it is useless to deny. They have, however, a common aim, which is admirably set forth in an article lately published, by Dr. Edward Brooks of Philadelphia on "How can the average child get a better education?" " 'The average child,' says Dr. Brooks, should be taught to speak, write, and read his mother tongue. Special lessons should be given in talking, and learning to speak correctly. There should be 'talking classes' as well as observation or 'seeing classes.' New words should be given, and the imperfections of articulation, pronunciation, grammatical construction, etc., carefully corrected until correct habits of expression are formed. The 'average child' of ten years can be taught to know by sight nearly all the words found in any ordinary series of reading-books. He can also be taught how to 'get the thought' from the combination of these words in sentences and paragraphs, if 'reading' is properly taught. Also children of ten years of age can be taught to spell all the ordinary words they meet in their readers, or which they would use in writing. They can also be taught to write a fair hand, and to express in writing what they actually know about any object or subject. The simple rules of letter-writing, how to begin, arrange, end, address, fold, etc., a letter, can be mastered by the ordinary boy or girl of ten."

To enter into the details of language work in a brief educational treatise like this is clearly impossible. While good text-books are essential it can readily be seen that they do not necessarily come first, and that various other aids and devices can be made very useful. Some of these we shall now proceed to consider.

A Special Table Needed For The Little Children.

It may be said here, incidentally, that while the teacher of any ungraded school cannot expect to have all the modern improvements in her schoolroom, she ought to insist on a long, low table near the platform, where the children can do a variety of special work, by classes or sections, either standing or sitting in chairs which match the height of the table. The latter does not need to be expensively finished, anything within the capacity of the nearest carpenter or even of the oldest boys in the school will do, but the top should be covered with the squared enameled cloth, accurately ruled in uniformly fine lines, which is so much esteemed by kindergartners and all teachers who make Busy Work a matter of scientific study. No teacher of little children who has once used such a table will feel that she can possibly get along without it. Grouped about it they can occupy themselves with many things which are both pleasant and profitable while she is attending to the older classes.

The Sentence Builder.

While the teacher of an ungraded school is otherwise occupied the little children can do a great deal by way of diverting and instructing themselves, seated at their desks or gathered in groups about such a table as has just been described. Boxes of words and letters have for a long time been found to be valuable helps in teaching reading and spelling, when placed in the hands of young pupils for their individual use. According to the principles laid down in the early part of this chapter The Sentence Builder should come first in the series of which we propose to speak.

As soon as the pupil has comand of a stock of five or six words sentence-building can begin by dictation from the teacher, and also the child's invention.

It is a box containing two hundred and twenty-five separate tablets, and forty-five different words, each of which is repeated five times. These words are all of them supposed to be familiar to the child and are printed on both sides of aubstantial and durable cardboard, in clear, bold type, so as to be read by the teacher at a considerable distance, although it is also so condensed that the letters take up the least possible space from right to left on the desk. In selecting the words the attempt has been made to present those which will readily group themselves into such language-stories as the child will be most likely to form for himself, with the occasional help of the teacher. Most of the nouns are capable of pictorial illustration and all the words are those will meet very early in his acquaintance with the First Reader. Wherever a word is suitable for beginning a sentence it is printed on one side of the tablets with its first letter as a capital, so that it can be used for that purpose when desirable.

The Word Builder.

This is a box of some two hundred letters, printed on small pieces of card-board of good thickness, accurately cut to gauges. The assortment comprises capitals and small letters, numerals and punctuation marks, in the same proportion as they occur in fonts of type, the same letter being printed on both sides of the tablet. The use of The Word Builder, follows that of The Sentence Builder, just as the spelling of a word, that is the separating of it into its parts, follows the reading of that word, which is recognizing it as a whole. The convenience and durability of this box of letters have made The Word Builder exceedingly popular.

The Word Making Tablets.

Some teachers prefer a box of letters in large type and on tablets an inch square for the same purposes for which others use The Word Builder. The letters in this box are printed on both sides of the tablets and are assorted as in fonts of type. The uniform size of the tablets gives a standard measurement for the pupil's eye, which is an excellent feature of the collection.

The Language Tablets.

This scheme for helping children to master the first steps in reading is more comprehensive than either of those mentioned above. The box is considerably larger and holds about six hundred words like those found in The Sentence Builder. It also contains a small box of letters like those in The Word Builder, so that a word made up from these letters occupies the same space as it would if printed on a tablet. There are two sizes of the tablets, one being an inch square and the other an inch by an inch and a half. So far as is possible a word and its derivative are placed on different sides of the small tablet, and when a tablet contains two wholly different words those beginning with the same letter are usually brought together, to facilitate finding the word wanted.

The pupil using The Language Tablets should know something about both reading and spelling. If he cannot find just the words which he wants to finish his story let him spell them out with the letters. While the number of words in the box is enough to give him interesting and valuable practice, as the list printed on the inside of the cover abundantly shows, it is not bewilderingly extended. From this list the teacher can check off a more limited selection for the immediate use of the smaller children, if she so chooses, placing the rest in an envelope to be sealed up and kept till wanted.

Having outlined Language Work in the briefest way it remains to suggest that a great deal of material will be described in the following pages which can be used to advantage in language lessons, but which, for convenience, is classified under other departments.

CHAPTER II.

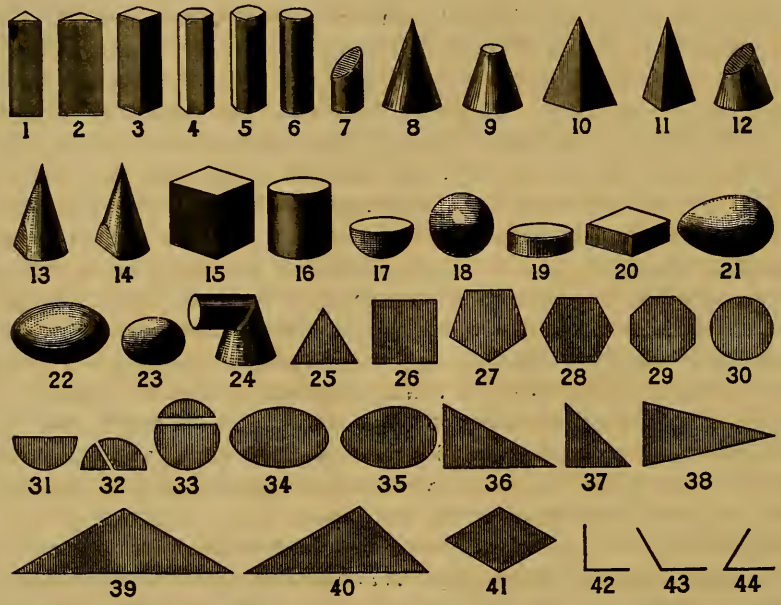
THE BEGINNING OF FORM STUDY.

A knowledge of the simplest geometrical forms, such as the cube, sphere and cylinder, is deemed an essential result of the right kind of primary work by all progressive teachers, a necessary foundation for much subsequent study. That such knowledge can readily be acquired by little children has been frequently proved in the kindergarten, where they learn, almost instinctively, the essential facts about a variety of solids, surfaces and angles. But it rarely happens that any member of an ungraded school is a kindergarten graduate, and the teacher should therefore take pains to make her pupils, during the first year of school-life, if possible, thoroughly acquainted with some of the forms, their several characteristics and how they differ from each other, placing the models in their hands, so that they can become familiar with them. This last is an essential point, because a teacher may hold a cube, for instance, in her hand and explain all about its edges, faces, corners, angles, etc., for an entire term, and then in one lesson of twenty minutes with the models in their own hands the pupils will learn more about the cube than they have in all the previous weeks of that term.

Form study has come to be accepted as the foundation of drawing and the modern school which lacks instruction in drawing is but poorly equipped, no matter what are its other excellences. But there are many teachers in the harness who scarcely know what form study is and are without knowledge regarding the proper way of teaching drawing. The thing for such teachers to do, if they have no means at hand for securing instruction along these lines, is to provide themselves with a set of models, and also with a series of drawing-books of established reputation, and work out the best results possible under the circumstances, transmitting to their pupils the knowledge which they have first made their own. Of course in this case, as in a multitude of others, any attempt to copy the system prevailing in city graded schools will be marked with decided modifications. A set of models for each pupil and a drawing-book for every child who is of suitable age to use one are scarcely admissible in the average ungraded school, but every teacher can have at least one set of models within her reach and the majority can fit themselves to do something in teaching drawing, provided they realize its importance. Those who do appreciate that importance can readily get the help which they most need through instruction by correspondence, if they will communicate with the

instructors of the schools which have been organized for this express purpose. The courses of study in these schools have been so definitely laid out and the text-books and objects for study so carefully arranged that it is confidently asserted by the promoters of these enterprises that any teacher of good abilities, who is willing to give a part of her spare time to earnest home-study for a few months, can become a capable instructor in form study and drawing.

GEOMETRICAL SURFACES AND SOLIDS.



We have here illustrated a set of forms which is well adapted to the use of a teacher whose pupils are not graded, both for self-instruction and teaching. It embraces the common surfaces and solids found in elementary geometry, together with a simple illustration of angles, the collection including twenty-three solids, seventeen surfaces and three angles. The solids are accurately and neatly made from well-seasoned hard wood and the surfaces from a very hard light-colored board, accurately cut with steel dies, the angles being represented by bent wires. The contents of the box is as follows :—

No.	SOLIDS.	
1 Equilateral Tri. Prism.	10 Pyramid, Square Base.	17 Hemisphere.
2 Right-angled Tri. Prism.	11 Pyramid, Triangular Base.	18 Sphere.
3 Square Prism.	12 Cone Truncated Diagonally.	19 Circular Plinth.
4 Hexagonal Prism.	13 Cone, with section showing the Hyperbola.	20 Square Plinth
5 Octagonal Prism.		21 Ovoid or Egg.
6 Cylinder.	14 Cone, with section showing the Parabola.	22 Ellipsoid.
7 Cylinder with Diagonal Sect.		23 Oblate Spheroid.
8 Cone.	15 Cube.	24 Combination of 7 and 12.
9 Truncated Cone.	16 Cylinder.	

SURFACES.

25 Equilateral Triangle.
26 Square.
27 Pentagon.
28 Hexagon.
29 Octagon.
30 Circle.
31 Semi-circle.
32 Two Unequal Sectors.
33 Two Unequal Segments.
34 Ellipse.
35 Oval.
36 Right-angled Scalene Triangle, having its two acute angles 30° and 60°.
37 Right-angled Isosceles Tri.
38 Acute-angled Isosceles Tri.
39 Obtuse-angled Isosceles Tri.
40 Obtuse-angled Scalene Tri.
41 Rhombus, Diamond or Lozenge, made from two equilateral triangles.

ANGLES.

42 A Right Angle, formed by a bent wire representing a line.
43 Obtuse Angle.
44 Acute Angle.

The curves of the Conic Sections, the Circle, Ellipse, Hyperbola and Parabola, are clearly shown in Nos. 9, 12, 13, 14. The circle is a plane section parallel with the base, the ellipse oblique to the base and cutting both sides, the hyperbola parallel to one side. The set is put up in a neat and substantial paper-board box.

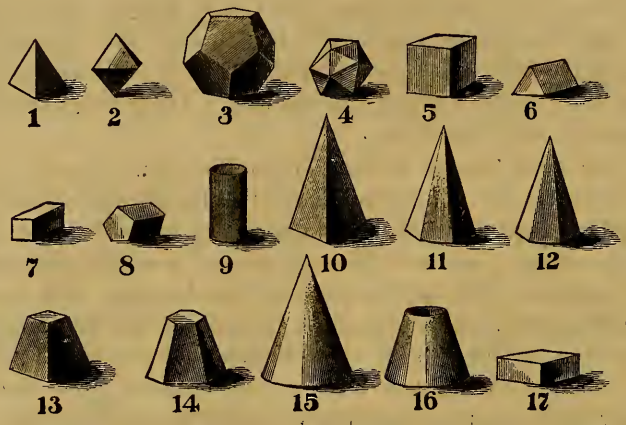
THE FIRST THINGS TO BE TAUGHT WITH THE MODELS.

Of course no teacher will wish to present all these forms to the attention of her pupils at the same time, but, as has been suggested at the beginning of this chapter, she will first seek to give them some knowledge of the simplest forms. This can be done by oral lessons. Let the sphere be the starting-point. By encouraging the child to handle it and answer questions about it he can soon be made to understand that it rolls in all directions and that its outline is a circle from whatever point viewed. In the cylinder he discovers a form which will roll in one direction but not in the other. He also sees that the end is a circle, and perhaps he may be made to comprehend, after some effort, that the side view is a rectangle. In the cube he is introduced to new features, plane faces with straight lines on the corners. Having proceeded by easy stages from the sphere to the cube, the square plane faces, right-lined edges and their angles will become familiar to the children, so that the right angle itself can be easily explained.

The pupils have now worked up from the ball to the surface and the lines. In order to illustrate the relation of the surface of a cube to the cube itself kindergarten teachers sometimes cut out a cube from an apple, a potato or some similar substance and slice off surfaces from it, before the children. But where the pupils are older than those commonly found in the kindergarten the same object can usually be accomplished by placing on the cube a card-board tablet corresponding in size with one of its faces, which when removed will represent a surface of the cube. Its edges show lines and its corners angles and by this means it is comparatively easy to demonstrate that the surface has been derived from the solid. Now the boundaries of the surfaces are lines, just as the boundaries of the solids are surfaces, and the piece of wire bent to a right angle may be applied to one corner of the square tablet and removed, so as to give the children an idea of the lines which form an angle when joined together.

The idea of an angle, as distinct from the surface included between the lines which form that angle, may be further explained by taking two thin sticks, or straight wires, one in each hand, and, after placing one end of one of them against an end of the other, gradually opening and shutting them, showing that the opening between them is the angle, but not the surface, because the size of the angle is not dependent on the length of the sticks.

BAILEY'S DEVELOPMENT OF SUFACES.



The material used for constructing these geometrical forms consists of card-board sheets with printed outlines of the developed surfaces of the principal solids. The list includes the five forms leading to the sphere, four varieties of prisms, three of pyramids, two of frustums of pyramids, with the cone, frustum of cone and plinth, and is as follows:—

1 Tetrahedon.
2 Octahedron.
3 Dodecahedron.
4 Icosahedron.
5 Cube.
6 Triangular Prism
7 Square Prism.
8 Pentagonal Prism.
9 Cylinder.
10 Square Pyramid.
11 Hexagonal Pyramid.
12 Pentagonal Pyramid.
13 Frustum of Square Pyramid.
14 Frustum of Hexagonal Pyramid.
15 Cone.
16 Frustum of Cone.
17 Plinth.

The forming of the several solids from the developed surfaces indicated on these sheets is a valuable exercise in manual training, and the pupils who undertake it learn incidentally the geometrical forms in advance of the study of geometry. The use of this material also makes it possible to readily secure a set of models for form study and drawing.

The set contains five sheets of card-board, each about eleven by fourteen inches, on which are printed the outlines of different developed surfaces, as well as dotted lines to guide the pupil in forming the solids.

The value of this work depends largely on its being done accurately and neatly, and both teacher and pupil should strive for perfection in these respects. A complete set of directions for forming the desired solids from the different developed surfaces is furnished with each set.

A Course In Form Study Outlined.

Having noted in a very general way the kind of work which a well-informed teacher will undertake with the models, it may not be out of place to indicate what might be attempted in a regular course of form study, even though the idea of such a thing may seem decidedly formidable to some teachers of ungraded schools. We are first to handle each solid so that the children shall get a concept of it, that is, become so familiar with it that when the name of the solid is mentioned a mental image of it will rise up before them. Then they should be encouraged to make the solid in clay, so as to express their idea of it as a whole, and next to give the theory of its parts, faces and edges. Then let the pupils express the ideas of the faces by cutting their shapes in paper and by drawing them on the board or on paper. Next make in clay objects based on the solids which have been studied. Use the plane figures found in solids in designs that may be pasted or sewed on card-board. Study the appearance of the solid when practicable and also the appearance of objects which are similar to this solid.

The following summary of what it is possible to do in form study during the first four years of a child's school life is from the pen of the late Dr. John H. French, director of drawing in the teachers' institutes of New York state:—

1. TYPE-SOLIDS.

First Year.

1. Sphere.
2. Cube.
3. Cylinder.
4. Hemisphere.
5. Square Prism.
6. Right-Angled Triangular Prism.

Second Year.

1. Ellipsoid.
2. Ovoid.
3. Equilateral Triangular Prism.
4. Cone.
5. Pyramid.
6. Vase Form.

(*a*) The first half of the first year the work is to be mainly the study of the six type-forms, with some attempts at representation by stick and tablet-laying. No drawing as a regular exercise is to be required this half-year.

(*b*) In the second half of the first year simple exercises in paper-folding and paper-cutting are required. Drawing is to begin in this half-year.

Method of Study:

1. By sight.
2. By touch.
3. By arrangement.

Order of Study:

1. As wholes.
2. As to faces.
3. As to surface.
4. As to edges and corners.

Ways of expressing:

1. By language. 2. By making. 3. By Drawing.

Plane figures to be taught:

1. Circle.
2. Square.
3. Oblong.
4. Right-Angled Triangle.
5. Equilateral Triangle.
6. Isosceles Triangle.

LINES ARE TO BE TAUGHT.

As to directness:

1. Straight. 2 Curved.

As to position:

1. Horizontal.
2. Vertical.
3. Oblique.

As to relation:

1. Parallel.
2. Perpendicular.
3. Converging and Diverging.

THIRD AND FOURTH YEARS.

1. Continuing study of the twelve type-solids.
2. Study of natural forms based upon those solids.
3. Teach reversed curves, symmetry, and proportion.
4. Drill in position, pencil-holding, pencil-movements and quality of line.

The study of models and objects is continued in the fifth year, being considered with reference to their industrial construction and also their pictorial representation. In the sixth year they are studied as to their appearance as wholes, that is, perspectively. The next year they are studied as to their perspective appearance when turned at an angle, particular attention being also paid to the foreshortning of rectangular surfaces and the convergence of lines retreating from the eye. During the sixth, seventh and eighth years all the work of form study and drawing is definitely divided under Construction, Representation and Decoration, and in the eighth year the various models and objects are studied as to their facts, some of them in section. Instruments are introduced, and the solution of simple problems in plain geometry is required, with the view of preparing the pupils for the application in practical industry of the principles already learned.

SUGGESTIONS FOR BEGINNERS.

In order to make plain to inexperienced teachers what has already been stated we insert here a few suggestions as to details by Prof. Langdon S. Thompson of Jersey City, published in the Teachers' Institute :—

FIRST HALF-YEAR.

Age of the pupils, 6 to 7.

1. THE MODELS TO BE STUDIED; sphere, cube and cylinder; the circle, square and oblong. *Material:* clay, sticks, colored paper, drawing paper.

Methods.—Let the pupil learn the use of the terms *on*, *under*, *middle*, *center*, *near*, *etc.*, *etc.* Then try the *actions* of the models; roll, slide, etc.

Then let *modeling* be tried with clay. Then let them name objects resembling the models. Teach to arrange, so as to teach apart, in rows, etc.

2. Models to be studied as to *surface*, also as to *relation*,—standing, lying, etc., etc.

3. As to FACES.—Sphere has one round face, cube six, etc. Shape of faces. (Pupils will select other objects having same shape.) Teach use of vertical, horizontal, opposite.

4. As to EDGES.—Curved on cylinder, straight on cube, etc. Tablet and stick-laying. Drawing the models. (Begin with cube held right in front in left hand, for example.) Lay sticks and draw them, (for example, making a square.)

5. As to CORNERS.—Shape, number, position; employ terms *upper*, *lower*, *etc.* Cut squares of paper and fold; model with clay.

6. REVIEW.—Terms *like* and *unlike*, *shape*, *size*, *dimensions*, *surface*, *faces*, *edges*, *corners*, *positions*, *etc.*, and see that they are clearly understood.

SECOND HALF-YEAR.

Materials.—[1] Hemisphere, [2] square prism, [3] right-angled triangular prism, semi-circle, right-angled triangle, also clay, sticks, colored paper, and drawing paper.

1. Nos. 1, 2, 3, studied as wholes. Relation of No. 1 to sphere; use terms, *equal* and *bisecting* by making sphere of clay, and cutting into two parts. Relation of No. 2 to cube. Name objects of same shape; bring such to school. Drawing. Hold objects in front of eye and draw one side, then another.

2. Nos. 1, 2, and 3, studied as to surface; use terms *round* and *plane*. Model objects having the general shape of 1, 2, 3, as *dish*, *half-an-apple*, *hen-house*, *etc.* Use terms *side-view*, *top-view*, *etc.*

3. Nos. 1, 2, 3, studied as to *faces*, name them (as No. 1 has one round and one plane face.) Shape of faces. Find objects resembling these faces. Position of faces, vertical, horizontal, oblique. Relation of faces parallel, perpendicular, oblique to each other. Draw and model faces.

4. Nos. 1, 2, 3, studied as to *edges*. Measure length in inches. Stick-laying to represent edges and faces. Tablet-laying, in ornamental forms, modeling and drawing.

6. REVIEW.—The six type-solids. Blindfold pupils and let them name models. Let them describe each in suitable language. They should now be able to draw from memory, the top, end, and side views of the different solids. Invent various means of giving an idea of the shape of each as by rolling paper around cylinder pasting edges, and then removing cylinder.

CHAPTER III.

CLAY MODELING.

The modeling of objects in clay is so closely allied with that form study which necessitates the handling of such models as have already been described that a few directions regarding clay modeling are next in order. The best results in form study are secured with pupils who are provided with clay from which to make the forms for themselves. Suppose, for instance, that the attempt is made to imitate the sphere in clay and the result is not wholly satisfactory. The contrast between the wooden model and the clay copy of it will show clearly where the fault lies. Having made the sphere in clay the child can easily convert it into a cube by flattening the sides on the modeling board. Illustrations like these might be multiplied indefinitely to show the advantages of clay modeling as a part of form study.

Any teacher who shall propose to introduce clay work as a part of the exercises of the average ungraded school must be prepared to meet a variety of objections. The parents of her children will be very apt to regard a proposition like that as a foolish way of spending precious time and also to argue that the occupation must be a dirty one, soiling clothes, fingers and furniture. And she herself may have misgivings at the outset as to how she can possibly find time for a task which, although it may be both delightful and instructive, is so entirely out of the usual course, or how she shall secure the necessary material. But having first convinced herself that modeling is the thing to have in her school the probabilities are that she will find ways and means both of introducing it and making it popular throughout the district.

A teacher of experience in this line of work writes: "The universal passion in a child to mould dough, mud, snow, etc., and everything he can mould into cookies, fruit and every conceivable thing, ought to secure to all in mature years the ability to make what is made to some extent artistic. This would be the result if the desire were encouraged and cultivated as one of the important factors in education. No half-hour in the week is spent more delightfully or in a more useful way by the little kindergarten child than that given to the clay. Let the tables be covered with enameled cloth and a small piece of clay given each child. Great care should be taken that the clay is made just right to handle and only as much be given to each child as he is likely to require for the form which he is to make. Many forms will be suggested, as an apple, peach,

pear, egg, etc., there being no end of the child's capacity for 'thinking up' forms to make, and the kindergartner has only to exercise tact and skill in keeping him within proper limits while she respects his imaginative flights and prevents his efforts from being aimless and desultory."

Too much stress cannot be laid on the idea expressed in the closing words of the above quotation. Clay work in the school-room must constantly combine beauty and business and never be allowed to drift into aimless play. The objection that such work is dirty is raised by those who are not familiar with its use and object. The children are not given a tub of clay to play with, but merely a small piece, of just the proper consistency for use. In this condition it is very cleanly and need not soil the clothes nearly as much as the use of chalk at the blackboard, while, unlike the chalk, it is beneficial to the hands, giving them a soft and smooth surface. Moreover, in the use of clay there is an entire absence of the dust arising from the crayon, which always fills the air while the work at the blackboard is going on. A small jar of moist clay may easily be kept prepared for use at no necessary expense after the first insignificant investment, as the clay may be repeatedly returned to the jar after having been used. The necessary amount of water to be added occasionally will very soon be determined by a teacher. Muddy clay can never be used to any advantage, and, as before stated, when the clay is of the proper consistency to work to the best advantage it is not dirty. Superior refined modeling clay can be bought of dealers in kindergarten supplies, put up in dry bricks of five pounds each, at moderate cost. Teachers living near a pottery can always secure from it clay of a reasonably good quality and those who are cut off from either of these sources of supply can afford to experiment with samples from any clay bank within their reach, as it sometimes happens that veins of excellent material can be found even in those deposits where the bulk of clay is mixed with sand.

But modeling need not of necessity be confined to clay. Whatever material is used in the school-room should be of such a nature as to be easily worked with harmless tools and not expensive. Plaster is too hard, and dulls tools too rapidly. Wax, while in certain combinations good for modeling, is too sticky for cutting or carving. Several investigators in this line have found a very useful and economical material in hard white soap, which may be easily and delicately cut into almost any shape with simple tools, not necessarily sharp enough to be in any way dangerous, and presents a very pleasing appearance, strikingly similar to ivory. Soap also has the advantage for home work that the waste is worth all it costs for domestic uses and with careful handling it may be economically employed in school exercises. Paraffine has several advantages over soap in that it is stronger, working safely to finer lines, is not affected by moisture from the hands or in taking moulds for making copies in plaster or other substances, and that the waste can be melted up

into blocks for other work. Paraffine has recently been put on the market in bricks of three sizes, at very reasonable rates. From simple bas-reliefs cut in either soap or paraffine, or modeled in clay, plaster moulds can be made from which duplicates of the original may be produced in plaster. A new material called Plastina, which does not dry like clay nor harden like wax, but always maintains its plasticity and softness, is recommended by C. Hennecke Co., Milwaukee, Wis. This firm publish Hennecke's "Art Studies," a work containing many valuable directions and illustrations relating to modeling, wood carving and drawing, and also manufacture a large line of art models for drawing and modeling. The manipulations already described are very simple and interesting and wonderfully develop "gumption" in the boys and girls. Various designs for modeling can be found in the Paradise of Childhood and any teacher of an ungraded school who can enjoy the opportunity of visiting a kindergarten or graded school where modeling is done will get many hints in regard to methods of using the material and forms to be reproduced which are not laid down in the books.

The Squared Enameled Cloth.

Although this cloth has been mentioned before, and may be referred to in subsequent pages, its use is so essential in connection with clay modeling that this seems to be the proper place in which to call special attention to it. Various unsuccessful attempts have been made to secure in the squared cloth an adequate substitute for the kindergarten table-top, the difficulty of making fine lines and accurate squares on the cloth being a serious drawback. The squares were first striped with a painter's brush, but the stripes were apt to be too wide for the best results. Other methods subsequently employed proved equally unsatisfactory.

The squared enameled cloth manufactured for the uses already indicated is accurately ruled in uniformly fine lines, by special machinery purchased at considerable outlay, according to the most approved processes of printing on oil-cloth, so that the red lines will wear as long as the black background. The cloth has a beautiful, varnished surface and is forty-five inches wide. The price is less than has hitherto been charged for a greatly inferior article.

In some schools this cloth is permanently fastened to the desks occupied by the little children and the teachers regard it as a great boon, not only for clay work but in connection with nearly all the kindergarten occupations. It only needs to be wiped over with a damp cloth to make it look as good as new when the exercise in clay is finished.

CHAPTER IV.

DEVICES FOR TEACHING FORM.

Aside from the models and clay modeling the teacher can avail herself of various devices which will help to fix correct ideas of form in the little children's minds and at the same time serve as busy work for them while she attends to the more advanced class. In fact the contents of this whole chapter would probably be classed as Busy Work by a multitude of teachers. Let it be, however, as has been hinted in the preface, a busy work which tends to development and is carried on by the teacher with a clear idea of what she is about, and not merely with the forlorn hope of keeping the children out of mischief. Most of the material to be described has been thoroughly tested by kindergartners and pronounced valuable.

The Inch Cubes.

One of the most popular diversions of the modern school-room is the use of inch-cubes for busy work and number work. They can be bought in boxes and in bulk, plain and in six colors, red, yellow, blue, orange, green and purple. These cubes represent the third kindergarten gift, and can be used in a great variety of ways for the study of form and design, as well as numbers and fractions. For specific directions the teacher is referred to the articles on The Third Gift in The Paradise of Childhood and the numerous illustrations found in the plates devoted to that gift. They show the method of constructing the "Forms of Life," "Forms of Knowledge" and "Forms of Beauty" which were so dear to the heart of Frœbel and which can be readily and advantageously modified to conform with the intelligence and experience of the children who are asked to make them. Let the little folks build from copies forts, bridges, towers, etc. In case they have never seen these objects they will listen with pleasure to short stories about them, and, associating the story with the form, be able to reconstruct the latter while they repeat the former in their own words. They will show themselves quite apt in teaching resemblances between the structures which they have made and the objects with which they are familiar. It is well sometimes to adapt such names of forms as the children apply themselves, and to allow them to invent forms, the teacher assisting the fancy of the little builder in the work of construction and assigning names to the edifice. In using colored cubes for all the occupations indicated above the children are trained to distinguish, classify and combine colors. These one-inch colored cubes have been adopted as necessary primary material in many of the leading American cities.

Mrs. Hailmann's Beads.

This name is applied to the half-inch forms of the cube, sphere and cylinder, assorted in six colors, which are used in many primary schools as busy work and an aid in clinching the child's knowledge of form, color and number. They are named from Mrs. Eudora L. Hailmann, an experienced kindergartner at La Porte, Ind., and present, in reduced size and in colors, the material which makes the second gift such a valuable part of the kindergarten system. Each piece is perforated for stringing, so that with the forms and six colors a great variety of combinations can be made, many inventions and exercises being admissible. Stringing the beads is an occupation which not only trains the eye to distinguish form and color but causes the child to exercise his will in directing the motions of his fingers. Watching the children at this diversion one cannot fail to be impressed by the cautious movements of the hands as they work out at the tips of their fingers the ideas in mind.

A variety of occupations are possible with this material. Let the teacher prepare a string of beads for the child to copy. In doing this the infantile student must consider not only the arrangement of the whole string, be it alternation or repetition of form and color, but number as well. To take all this requires more than a casual glance and to reproduce it demands that the whole attention of the little worker shall be concentrated in his employment. While he is thus occupied he will find less time to give his slate innumerable washings, to arrange and rearrange his various belongings and to punch his seat and his neighbors. Mrs. Hailmann's beads are sold in small boxes, each of which contains thirty-six in assorted colors, and a shoe-lacing on which to string them, also in gross boxes and in bulk. For further suggestions regarding their use the teacher is commended to any standard treatise on the second kindergarten gift.

Papers and Straws for Stringing.

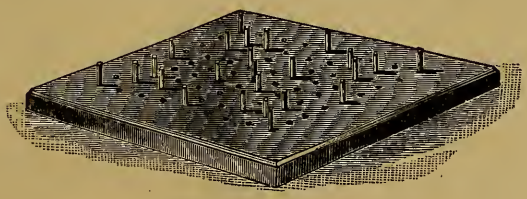
One of the principal objects of busy work is to train the children so that they may gain in power not only to know but also in the equally important power to do. Suppose you give a child discs of colored paper and short pieces of straw and ask him to make with them one of those beautiful festoons which are so often seen on the walls of kindergarten rooms. If he has never had any experience in stringing the beads the task will be almost impossible. But after such training he will not find it difficult to adjust the papers and straws with artistic harmony, a fact which indicates a positive growth in his power to observe and his ability to control the motions of the hand.

The paper is cut in circles an inch in diameter and also in inch squares. Each form is sold in packages of a thousand pieces, assorted colors. The straws can also be bought in packages of a thousand pieces, each an inch long, either plain or assorted in six colors. The operation of stringing the straws and discs of colored paper together, so as to form a very at-

tractive chain, and the straws, although it may seem to a superficial observer merely a pretty device to keep children out of mischief, aids in establishing the idea of an inch, foot, square, circle, and the center of the square and circle.

The alternation of colors compels the child to give the closest attention to his work, while the delicacy of material demands a skillful touch. Consequently if "the committee" who visits your school, seeing the little children at the table busy with straws and discs, should wish to know the use of all this "fancy work," you can show him that the pupils are working out number lessons.

Twelve of the one-inch straws when placed together, end to end, make a foot, and the same is true of twelve paper discs laid in a row. Consequently the small boy who actually makes a foot in this way gets a much clearer idea of what a foot means than he could possibly gain from a book at a later period in life. The stringing of the papers by twos and threes in assorted colors can be made an exercise in addition or multiplication, while the handling of the squares and circles is of necessity a branch of form study and gives the pupil some of the first steps in the study of geometry. And then you can call the attention of the official visitor to the care needed in order to produce a complete chain, emphasizing the fact that each time the little fingers push the needle through disc or straw they do so at the bidding of the child's will, that each act of willing and doing gives him an increase of power which is, as a result, of far more value than the knowledge of arithmetic which he has incidentally acquired.



PRIMARY PEG–BOARDS.

A very desirable part of the busy work outfit is a set of primary peg-boards and a quantity of colored pegs to go with them, the object of these things being to develop the ability of the children to copy and originate symmetrical forms and pleasing combinations of colors. The boards are about six inches square, and have one hundred holes drilled in them, in squares, half an inch apart. Round, neatly turned pegs, an inch long and in six colors, one thousand in a box, and also a cheaper assortment of square shoe-pegs are sold with the boards. The pegging of lines, angles and geometrical forms and the invention of new forms and combinations will prove not only a diversion to the little ones but will afford them valuable instruction.

Fig. 1.

Fig. 2.

Fig. 3.

Drawing Stencils for Our Little Artist.

Drawing stencils made from leather-paper with perforations for the insertion of a lead or slate pencil have become very popular as fascinating and educational busy work. We mention them here as related to the general line of busy work merely, not claiming for them any particular value as an aid in the teaching of drawing, unless the work is carefully elaborated, as shown in figures 2 and 3. The use of the stencils is very simple. First place one of them on the paper or slate on which the picture is to be made and follow the openings with a well-sharpened pencil, taking care not to let the pattern slip. The result of this operation is illustrated on a reduced scale in fig. 1. As simple busy work for young children such practice is interesting and may prove valuable as manual training, but it can also be made the foundation for more advanced work with older pupils.

After making the tracing, as described, and shown in fig. 1, the broken lines may be joined to form an outline drawing, as in fig. 2. This outline can now form the basis for several styles of finished drawings. If the sketch is made on paper with a rough surface it may be shaded with a lead pencil or colored with crayons, colored pencils or water colors. If the outline is made on a smooth, hard surface, it can be finished with pen and ink, as shown in fig. 3, which is a photo-engraving from a pen drawing executed exactly as above described.

The new line of stencils with American designs is much more attractive to American children than the foreign collections which have hitherto occupied the field and they contain outlines for making words as well as pictures. Two sets are published, No. 1 and No. 2, each in an ornamental box, with chromo label, bearing the title, "Drawing Stencils for our Little Artist." Each box contains twenty stencils, with a stock of practice drawing paper and directions for use. The stencils will be found particularly useful for occupying those children who are constantly teasing for "something to do."

CHAPTER V.

THE TEACHING OF COLOR.

The importance of giving instruction regarding color in the public schools is being quite generally acknowledged and emphasized by the most thoughtful teachers of to-day. They feel that they ought to teach their pupils how to distinguish colors from each other and give the different colors correct names, as well as to know which of them can be brought together with good effect. Consequently there is no subject that is provoking more earnest discussion in progressive educational circles to-day than the question how the essential facts about color shall be taught. It is a question concerning which there are many diverse opinions and some theories which clash more or less with each other, but these very discussions are expected to do much in the way of making color an exact science and placing the teaching of color on a scientific basis.

The teacher of an ungraded school who is ambitious to do something in color will find that colored papers offer the simplest and cheapest material for such work. After a little study of the subject she will also find that the color-teaching of children should be an effort to impart such a knowledge of the different colors that they will be recognized whenever the eye rests on them, and that their harmonies and contrasts shall be felt. Color-teaching also includes the effort to impart the knowledge of how the different colors are produced, but this line of work requires a higher grade of skill than the other, involving manual dexterity and judgment, and it should be preceded by the knowledge of the results to be accomplished.

In the color-education of the past, two things which are intimately related in practice, but are nevertheless absolutely distinct, have been sadly mixed. The education of the eye to match, compare and select good and bad combinations is entirely separate from the ability to produce these same colors by combining pigments. The first process is adapted to the youngest children and may be carried on in a large school at very moderate expense, without necessarily involving an explanation of the science of color. Consequently the work can be taken up by any teacher who has good taste in colors. At the same time it is better that the teacher know much more of the science than she has occasion to teach, and thereby be able to avoid imparting false theories to be unlearned in later life. Before attempting to use colors in the school-room she ought to procure a collection of well assorted and designated colors in some convenient material and with suitable books of instruction learn what combinations are

good, and why they are good. Any attempt to state even the most elementary principles of color in the space available in a book like this would be utterly futile, but for all essential information on these points the teacher is referred to a small book entitled "Color in the School-room," published by Milton Bradley Co., which attempts to state plainly and briefly the science of color and the artistic use of colored materials, so as to get color-education on a sound basis.

When the actual work of teaching begins the child should be introduced to the six strong standard colors, red, orange, yellow, green, blue and violet by name, and be taught to distinguish one from another.

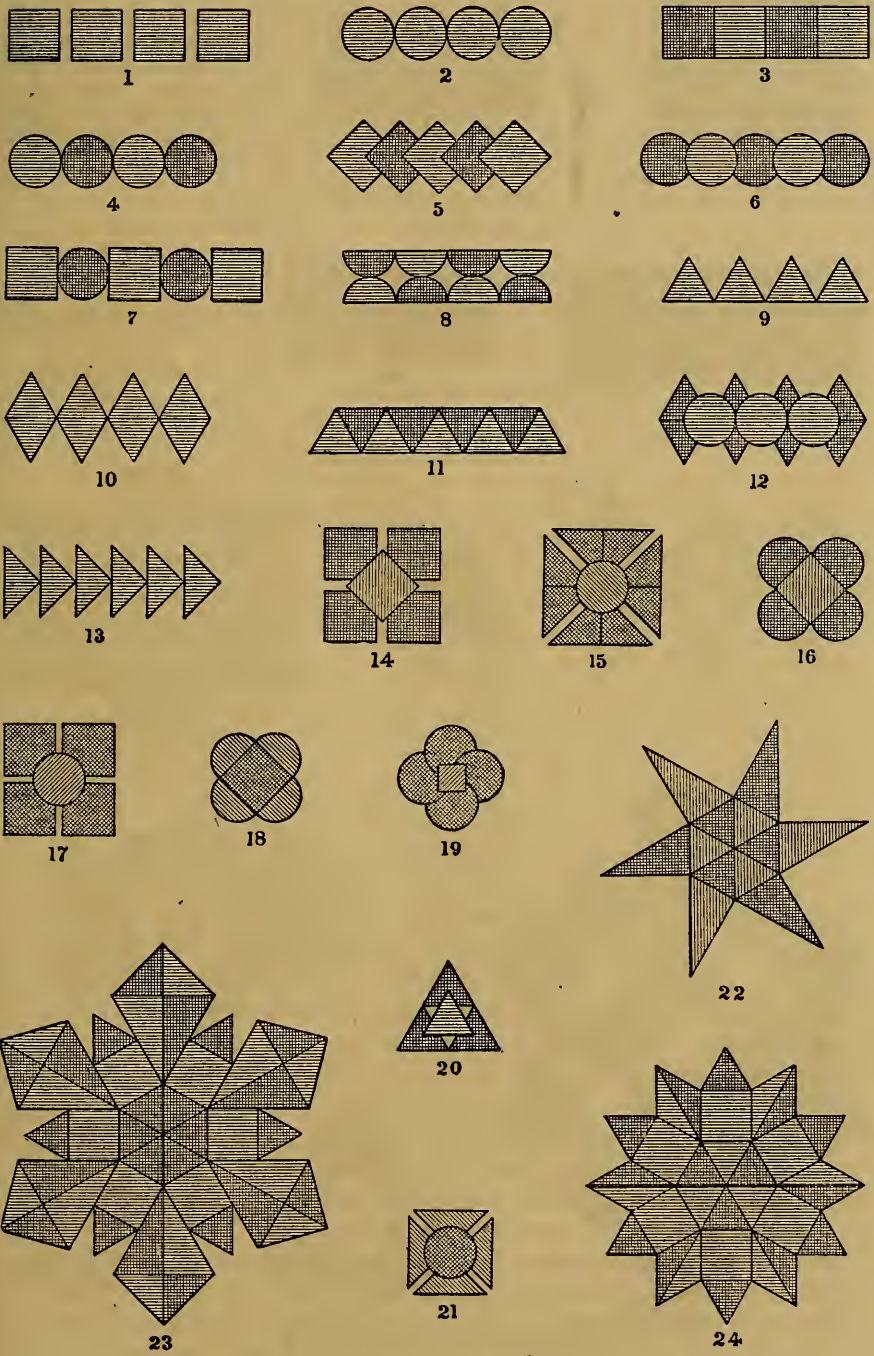
Then he must be trained to distinguish and name modifications of these standards, for, so far as material colors are concerned, all colors may with some truth be said to be formed from these six, with the admixture of white and black, while certain authorities insist that the combinations of red, yellow and blue with white and black will produce all the different shades and tints of the several colors. Without joining it this discussion we may safely assume that there are six standard colors and that other colors are combinations of these, with the use of white and black. We should teach the children at the outset that a *tint* of a color is that color more or less reduced with white, and that a *shade* of a color is a mixture of a color with black. A *hue* of any color is that color modified by the admixture of a small quantity of another color.

The teaching of color can be done most effectively in the primary schoolroom through the occupation of parquetry, weaving and sewing, all of which are given a prominent place in the kindergarten course. Weaving and sewing are described elsewhere in this manual and the plates accompanying this article may help to explain parquetry, which is the forming of symmetrical and harmonious designs with colored papers cut in the forms of the wooden tablets which are found in the Seventh Kindergarten Gift.

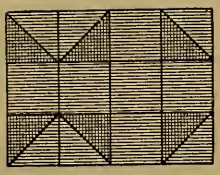
The designs are rendered permanent by mounting them on card-board sheets, which may be made into sample-books of the children's handiwork.

In parquetry the circle, square and triangle, which the child has learned to recognize in his previous form study, become the units of the simple designs. These arrangements of designs should be an expression of the principles of repetition, repetition and alternation, repetition of a unit around a center to fill a given space, and the use of a central form.

The first principal of repetition is taught by repeating horizontally squares, circles or triangles of one color, illustrated in Nos. 1, 2, 9, 10 and 13 of the diagrams connected with this article. The principle of repetition and alternation is taught by using two forms of the same color, or a shade and tint of the same form, as in Nos. 3, 4, 5, 6, 7, 8 and 11. Repetition round a center is represented by Nos. 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24. The designs aside from those already mentioned are intended to cover an entire surface, many of them being serviceable for tiling.



Designs in Form and Color.



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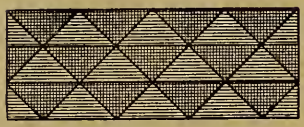

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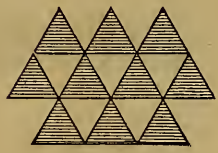

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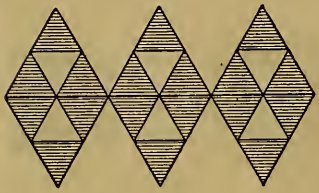

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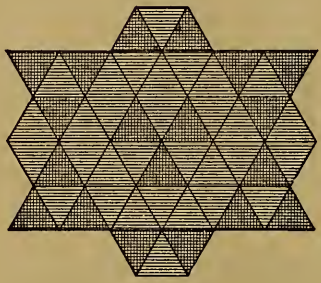

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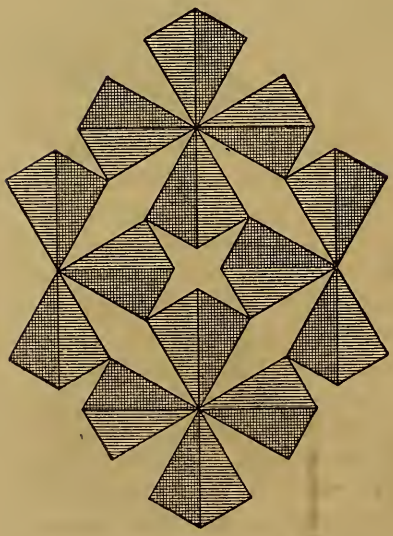

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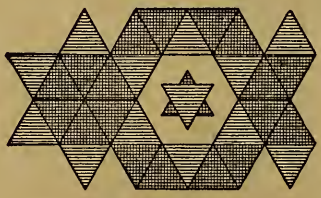

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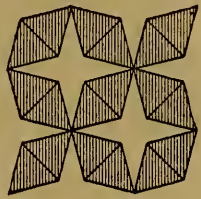

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Designs in Form and Color.

CHAPTER VI.

STICK LAYING.

The use of straight sticks in assorted lengths, to represent straight lines as a simple means of delineating a multitude of forms and also, later on, for making forms to be drawn with the pencil, has become very popular with progressive primary teachers. This occupation is borrowed from the eighth kindergarten gift. As the tablets of the seventh gift represent the surfaces surrounding and limiting the solids, so the sticks are used to represent the lines bounding those surfaces.

The stick leads us on another step from concrete material toward the realm of abstractions, furnishing the material to draw the outlines of rectilinear objects by bodily lines as perfectly as it can be done.

The sticks are favorites with the children. Their imagination sees in them a variety of objects—in fact they are the representations of everything straight—and the world of occupation furnished by them is a continual wonder to the teacher who learns how to use them aright. With them the child can learn to count, to add, subtract, multiply and divide, and they also can be made to help him along several steps toward his drawing lessons.

Although the thin, square stick in common use has several edges and sides, yet if it is presented as the representation of a large line it will be so accepted without criticism. The sticks are in assorted lengths of from one inch to five inches, some of them being the diagonals of squares from one to four inches, and they are also furnished in three or six colors. With these simple sticks the terms horizontal, vertical, perpendicular, oblique to right or left etc, etc., may all be worked out by the pupils, the teacher meanwhile noting the results at a glance, and causing any necessary corrections to be made without the constant rubbing out which is necessary with slate and pencil. The advantages of the sticks over the pencil in the earliest stages is well described in the following testimony of Mrs. Eva D. Kellogg, now principal of the Sioux City Ia., training school, regarding an experience which she had some years since :—

"Vertical and horizontal lines had been before teacher and pupil for several days, till the teacher was positively certain that they were understood by the class, whether in window-sash or slate-frame. Still when the pencil attempted to reproduce the simplest designs by their use, confusion ensued, and straight lines of any kind were an impossibility. She went to her desk, took out kindergarten gift No. 8, and silently distributed the

bright colored sticks among the delighted, wondering children. 'Now give me two verticals,' said the teacher, and the dullest pupil in the class had two parallel perpendiculars before him at once. Horizontals followed equally correct, and by dictation alone were boxes and chairs made by wee people who have never been able to follow a direction before. One little fellow, who had seemed to be an embodiment of stolidity, seized upon those attractive invitations to activity as a duck would splash into the first water she ever saw, and astonished the teacher with such accuracy of eye-measurement and deftness of touch that her respect for the future artisan went up at once. 'Shall I ever learn to let these children learn to do their work themselves with the blessed help of attractive objects, and not try to force them into *my* way of doing things?' she thought as she gathered up the big bunch of delicate sticks, not one of which was broken or injured. Something else be sides lines was taught that day, and the children were not the only learners."

The squared tops of the regular kindergarten tables are very valuable for guides in symmetrical designing with sticks, whenever they can be secured in the school room. But a convenient substitute, which can be afforded by everybody is found in the squared enameled cloth, with black back-ground and red lines. By covering the desk of each pupil with a piece of this cloth of the proper size during the time of the stick-laying exercise the teacher easily secures the required conditions for doing that sort of work to advantage,

There is another method of obtaining guides for designing with the sticks. Let the most advanced children in the higher grades carefully rule sheets of heavy paper, nearly as large as the desk-tops, in one-inch squares, an occupation which will give them excellent practice in the line of manual training.

Another excellent use of the sticks is to explain what an angle is. It is difficult to make a child comprehend that an angle is the divergence of two lines rather than the surface between them, but if two sticks are held before the pupils with the lower ends in contact and the upper ends separated and the statement is made that the angle is the "opening" between the lines, and at the same time the sticks are made to open and close—thereby conveying a practical idea of the opening as distinct from a surface—a much clearer idea of the angle is presented to the child's mind than can possibly be imparted by simply making him familiar with lines on a surface.

After the simple geometrical figures have been constructed with the sticks many forms of beauty and life can be made. Valuable suggestions for using the sticks can be found in The Paradise of Childhood, with a hundred and twenty-five illustrations of designs.

The sticks having thus served their purposes for the elementary construction of forms, the forms so made and many others may now be used

as models for drawing. For a surface on which to make the drawing give the pupil paper covered with small dots in one-inch squares. These dots correspond with the crossings of the lines on the desk or table-top, on which the sticks are laid, and thus serve as a guide to help the young draftsman locate his lines.

Stick laying is capable of such varied use by way of instructing and diverting little children that it is neither necessary or possible to give more than the merest hints regarding it in a chapter like this. The advantage of the sticks in connection with the teaching of number-writing is fully set forth in Chapter XII. The accompanying page of diagrams will suggest some of the many ways in which the sticks can be laid, so as to brush away from the minds of the children various elementary difficulties regarding vertical, horizontal, oblique and perpendicular lines, right obtuse and acute angles and other geometrical forms. The figure included in Nos. 1 to 11 illustrate vertical, horizontal, oblique and perpendicular lines and those in Nos. 12 to 21 different geometrical forms embracing right, oblique and acute angles. In stick laying many forms of life and beauty are wrought out by the children, and in making them the greatest possibilities of invention are opened to the youthful minds and little fingers. In the diagrams Nos. 22 to 28 represent forms of life and Nos. 29 to 35 forms of beauty, or decorative designs. Whenever the child forms a design worth preserving the teacher should take pains to let him draw it, either on plain paper or the netted kinderarten drawing-paper. In this case the sticks become the model from which to make the drawings. The diagrams are drawn about one-eighth the size of the actual design, the shortest lines representing sticks an inch long, the other lines being in like proportion.

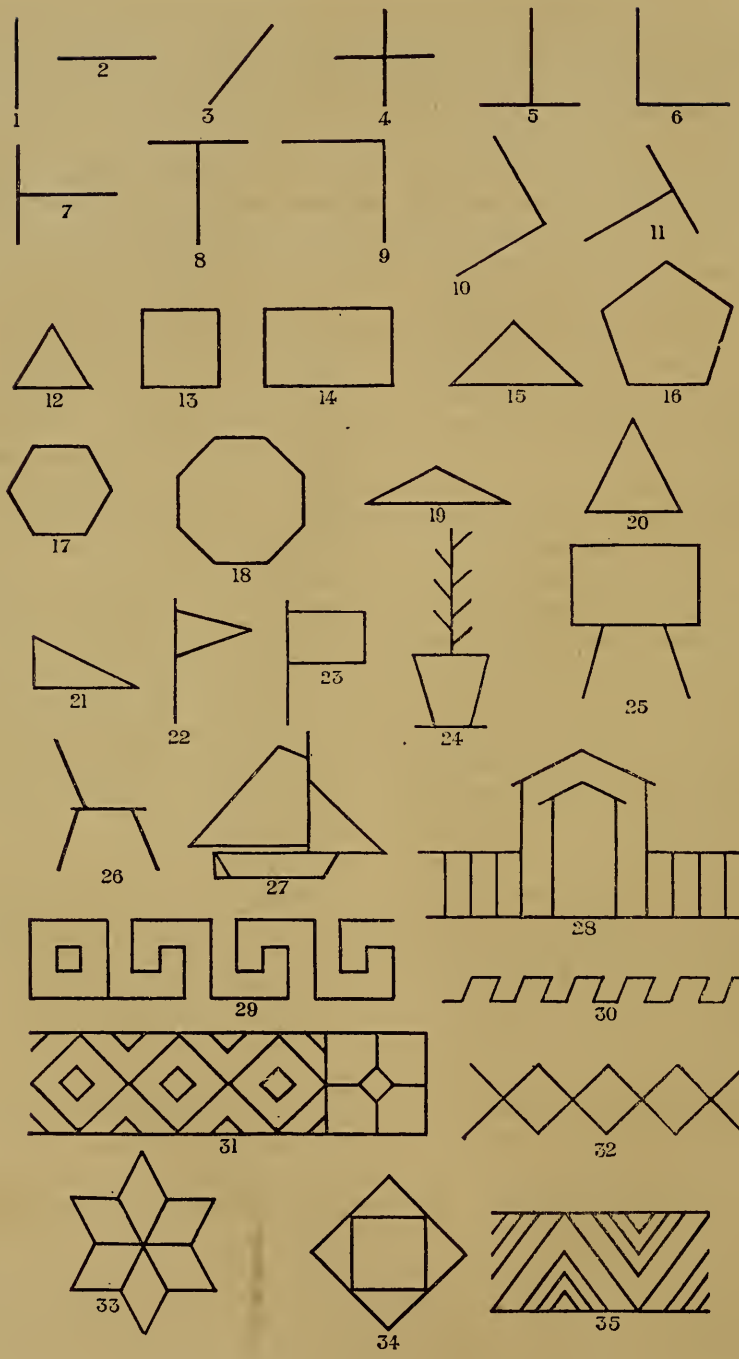
The Colored Sticks.

The colored sticks are sold by the thousand, in packages of one, two, three, four and five-inch lengths, assorted colors, and in boxes containing lengths, assorted, from one to five inches. They can also be bought in polished wooden boxes, which hold fifteen hundred, assorted lengths and colors. They are prepared by a peculiar process which insures a beautiful coloring.

The Plain Diagonal Sticks.

There is also a demand for sticks cut to the diagonals of various figures, and they are finished in the ordinary wood color, to distinguish them from the other sticks of nearly the same length.

They are sold in the same way, as regards length, as the colored sticks although the price is less.



SUGGESTIONS FOR STICK LAYING.

CHAPTER VII.

CARD-BOARD SEWING.

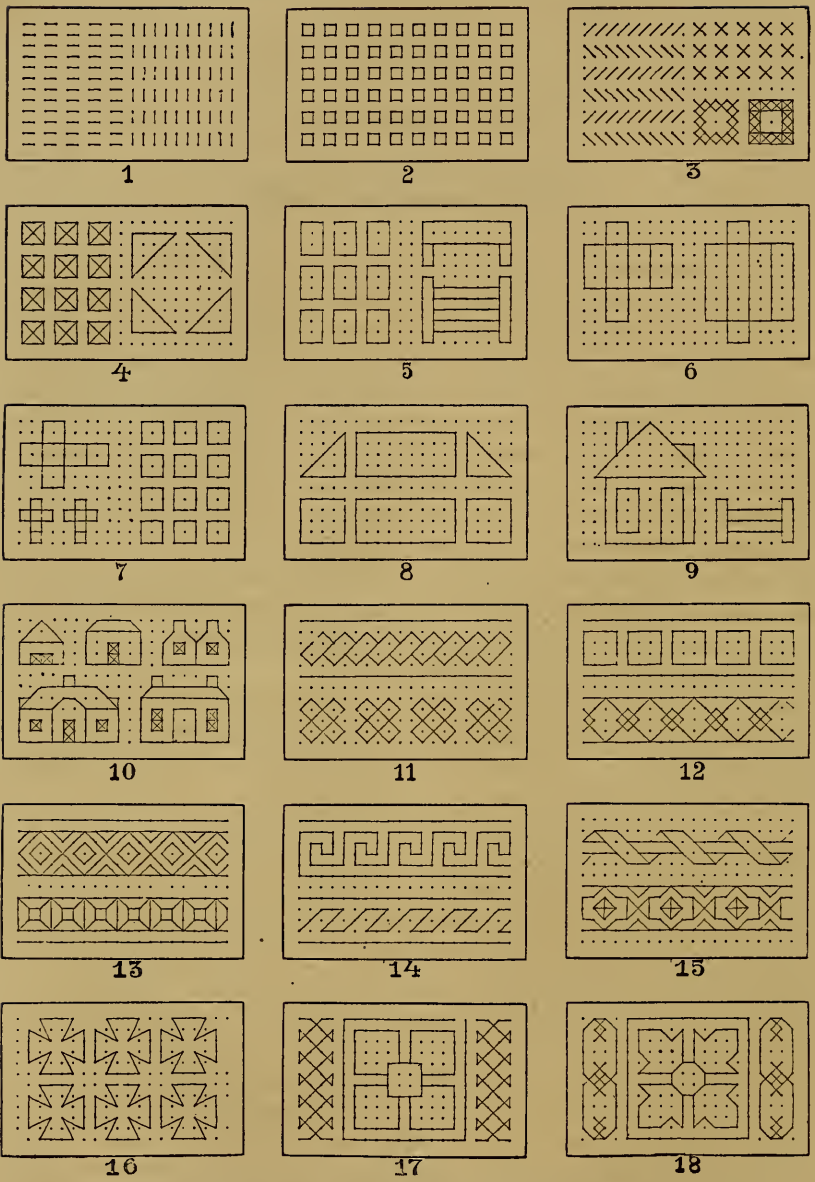
Little fingers should be taught to handle the needle deftly, irrespective of sex or future prospects, just as they should the pencil, thereby gaining a nicety of touch which may help them in the handling of many another tool in after years. The small boy, in his quiet moments, can have just as good a time with needle and thread and lay just as broad foundations for his future usefulness as does his little sister. Under the old system of "busy work," which accepted almost any suggestion tending to make that low-caste individual who is always dealing out "some mischief still" keep his distance, a few boys have, in early childhood, pieced patch-work quilts which kept them warm during a college course. But these lines must not be constructed as a plea for a universal primary sewing-school with utilitarian ends in view, for the present teachers of little folks demand such busy work as shall educate the pupil to appreciate artistic forms, as well as train him in manual dexterity.

From all of the many helps which are within reach of the average teacher she can make few better selections than to choose the sewing cards for her youngest pupils. The children readily learn to use them, take delight in the occupation and gain much from its pursuit.

The Primary Pricked Sewing Cards.

These cards are pricked in squares of quarter-inches over the whole surface, which can always be used to advantage in connection with form study and drawing. The geometrical solids are now made the basis of all intelligent work in drawing, and the lines and plain figures found in these solids can be reviewed on the cards, and patterns worked out which have been previously designed with sticks and tablets. Such sewing is a direct outgrowth of form study and drawing, and is profitably taught in the time of drawing, until the pupils are able to work independently, when it becomes valuable as busy work. In all netted and dotted guides for busy work there is a tendency to introduce intermediate divisions of the inch other than halves, quarters, eighths and sixteenths, but it is always undesirable to do this, on general principles, as these are the sub-divisions found on all common measures.

The diagram of designs for sewing which accompanies this chapter is intended to furnish suggestive exercises, which can be constantly varied to suit the teacher's taste. The designs are supposed to teach the formation of the following lines and figures :—



SUGGESTIONS FOR THE PRIMARY PRICKED SEWING CARDS.

No. 1, Horizontal and Vertical lines.
" 2, Squares, a combination of the Horizontal and Vertical lines.
" 3, Oblique lines. Combinations of Oblique lines.
" 7, Squares and Developments of Surfaces of Cubes.
" 4, Combinations of Squares with Diagonals.
" 5, Oblongs. Combinations of Oblongs in forms of life.
" 6, Patterns or Developments of Surfaces of Square Prisms.
" 8, Three views of Square and Triangular Prisms.
" 9, Combinations of Triangles and Oblongs in forms of life.
" 10, Combinations of all forms previously used into forms of life.

Nos. 11, 12, 13, 14, 15, Oblongs, Squares and Angles repeated horizontally.

Nos. 16, Surface Covering.

Nos. 17, 18, Large figures illustrating repetition around a center, and various forms of beauty or ornaments.

These designs when finished should not be the result of chance combinations obtained by filling in and rubbing out lines until a pattern happens to appear. On the contrary, the principles of design should govern the simplest work. The borders in lines and angles should be planned by using pegs or sticks; surface decorations and repetitions around a center by the use of tablets.

This work should also aid in the study of color. When two colors are used great care must be taken to develop a feeling for good combinations. Some teachers believe that it is better to use a standard with a soft gray, or a standard with a shade or tint of itself, than to combine contrasting colors, maintaining that the sharp contrast of complementary colors is to be avoided, even in this stage of primary work. This is more fully considered in Chapter XI. An intelligent use of these cards will give the children manual dexterity, some feeling for color, and practice in combining known forms according to the principles of design. They are commonly sold in boxes containing one hundred cards.

Embroidery Design Cards.

These cards are four inches by five and a half and are printed in a large variety of outline designs, with a dot at each point where a stitch is to be taken. A hole must be pricked through each dot before the sewing begins. The cards are put up in envelopes, fourteen in each, and sold in seven sets, being grouped as follows:—

No. 1, Animals.
" 2, Animals.
" 3, Figures of Children, etc.
" 4, Figures of Children, etc.
" 5, Flowers.
" 6, Familiar objects, Hat, Drum, Vase, Pear, etc.
" 7, Assorted designs from the other groups.

SUGGESTIONS FOR THE EMBROIDERY DESIGN CARDS.

Embroidery design cards are a very popular feature of the kindergarten system. The selections just mentioned are printed on white card-board, but of a cheaper quality than the fine bristol board used by kindergartners. In place of the costly embroidery silk which has been regarded necessary in kindergarten practice there is provided a line of Embroidery Cotton, in the six standard colors and a soft gray, especially adapted for use in primary and ungraded schools.

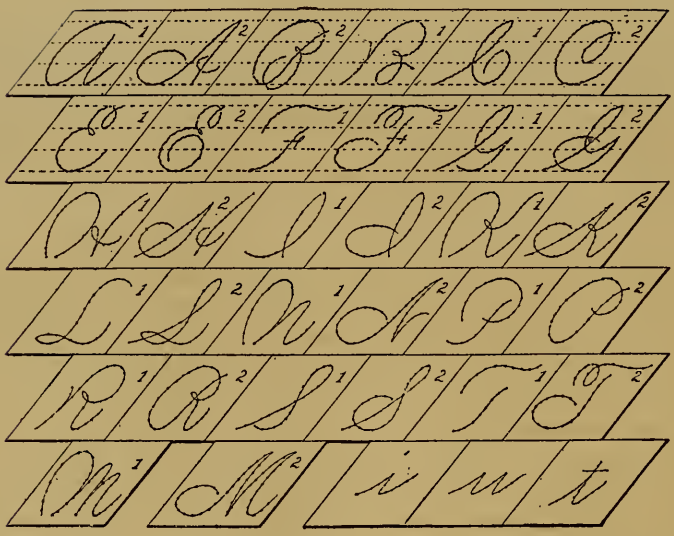
In order to prick a hole at each dot neatly and properly the card is laid on a piece of thick felt and a strong needle, inserted in a handle, is forced through the card into the felt, holes of uniform size for the reception of the threaded needle being formed by the process. After a little practice the children learn to do the pricking very nicely and it is always a pleasant occupation for them. The embroidery cotton is on spools containing about three hundred yards each, assorted in red, orange, yellow, green, blue, purple and gray. The spools are sold singly or by the dozen, and so are the pricking needles and cushions. The latter can be bought with or without stiff card-board backs. The sewing is done with any ordinary needle suitable for the thread.

On the second page of illustrations accompanying this chapter will be found a number of designs taken from the envelope just mentioned. The top row indicates those which were selected from No. 1 envelope, the second row those taken from No. 2, and so on down. The pictures in the first row are represented as having been worked, while the others are shown with the dots for pricking, preparatory for working.

With this modified material the expense is so reduced that the occupation, considering its value as an educator, has become one of the most economical that can be made a part of primary work. The delight attending such an occupation, like many good things in life, must be witnessed to be appreciated, and it must also be tested by its fruits before its worth as a training for the hand and eye and all the perceptive faculties can be justly estimated.

Cooley's Writing Embroidery Cards.

The chief design of these cards is to fix in the child's mind a correct immage of the form of the script letters, while furnishing him agreeable seat work. The methods and materials are about the same as those used with the embroidery design cards. While the pupils are stitching the outlined form of the letter on the card training in both color and form can readily be given them, as well as in varieties of lines and curves. To secure the best results the teacher should instruct them to work the typeforms of the letter in one color and the remainder in some other color which is suitable to be combined with it. For example, the *i* form is found in *i*, *u*, *w* and *t*, the pointed oval appears in *a*, *d*, *g* and *q*, the loop in *l*, *b*, *h*, *k* and *f*, and the union of right and left curves with the main slant in *x*, *n*, *m*, *p* and *h*,



When the children are working the *i* or the *u* the teacher can direct them to work all the main slants in one color and the right curves in something else which will harmonize with it. When the first or long left curve is used, as in the *a* or *d*, they may be required to use different colors for each of the different kinds of lines, right curves, left curves and main slants, so as to fix in their minds what lines form the letter, and just where they come.

Again, in order to lead the child to see that the same form is often repeated in certain letters, it is well to take up the letters in some order which will clearly show this fact and have the central form stitched in one color and the rest of the letter in another.

The collection for school use consists of sixty-eight different cards, representing the small letters and the capitals of the alphabet, and also sixteen duplicates of the capitals, so as to include all the business and standard forms which are approved by the best teachers of writing.

These cards are cut at an angle of 52°, a shape which reminds the pupils of the standard slant of the letters, and the comparative height of the various letters is kept before the child by the light horizontal rulings across the face of each card, which indicate the spaces by which the height of the letters is governed, the base line being made heavier than the others.

The different cards are put up in boxes containing fifty letters of a kind, and will also be sold in bulk. In ordering capitals teachers must be careful to use the numerals indicated in the above illustrations. If for instance, the standard form of the letter A is wanted, the order should read "A 1," but if the business form is required, it should read "A 2."

CHAPTER VIII.

PAPER WEAVING.

The weaving together of strips of colored paper so as to construct symmetrical and beautiful figures is one of the most useful kindergarten occupations and is well adapted to the first and second years of primary school work, both as a discipline to the children in nice manipulations and in forming artistic combinations, and also as an amusement.

The foundation of each design in all this weaving is a sheet of paper slitted into strips, which are joined by a margin at each end, this sheet of paper being called a mat. Into this mat are woven narrow strips of paper of a different color. The weaving is done with the aid of a flat steel needle, having a spring catch to receive and hold one end of the strip to be woven into the mat. By passing the needle over and under the strips of the mat the strip attached to the needle is readily and quickly woven into the pattern.

The sheet of strips to be woven into the mat is called a fringe, because the loose strips composing it were formely joined only at one end. Now, however, for convenience in handling, the strips are joined at both ends and are really mats, except that the border of the fringe is not as wide as that of the mat. Before using the fringe, it is desirable to separate the strips from each other with scissors, as fast as they are wanted, and not undertake to tear them apart.

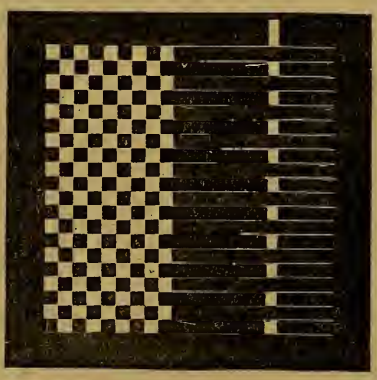
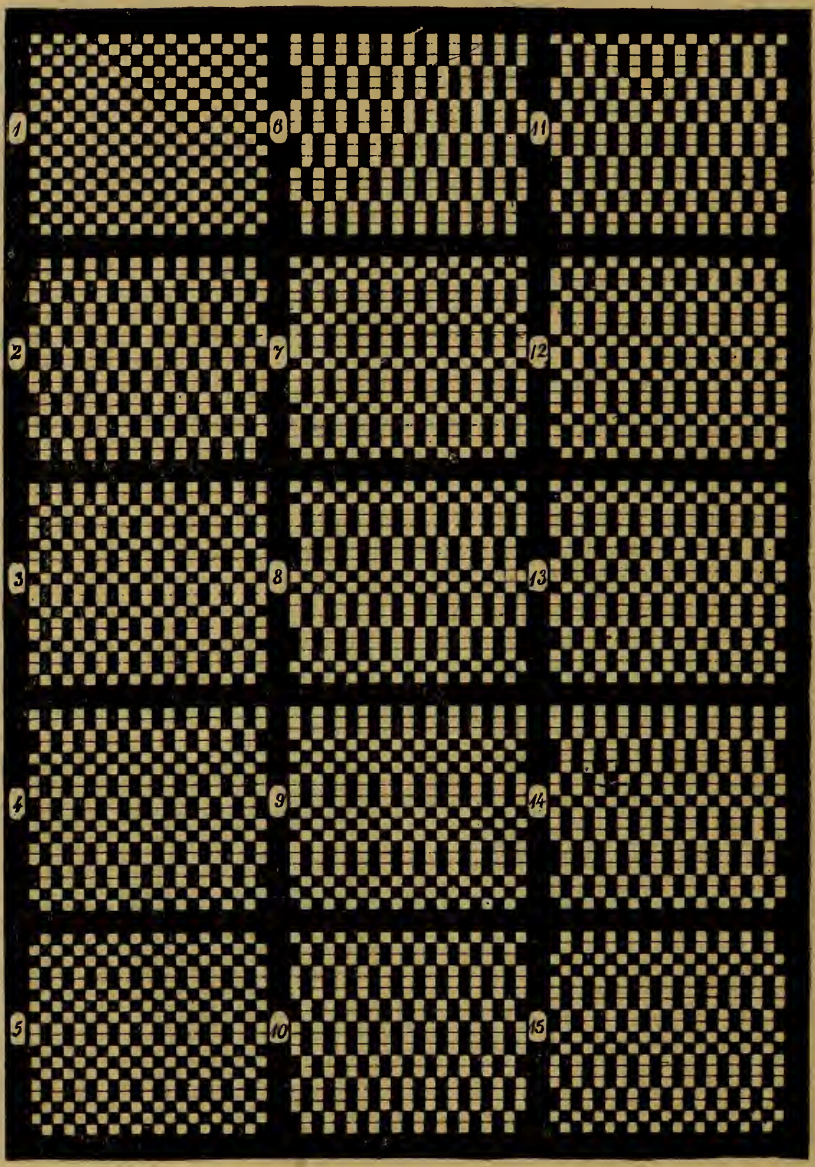
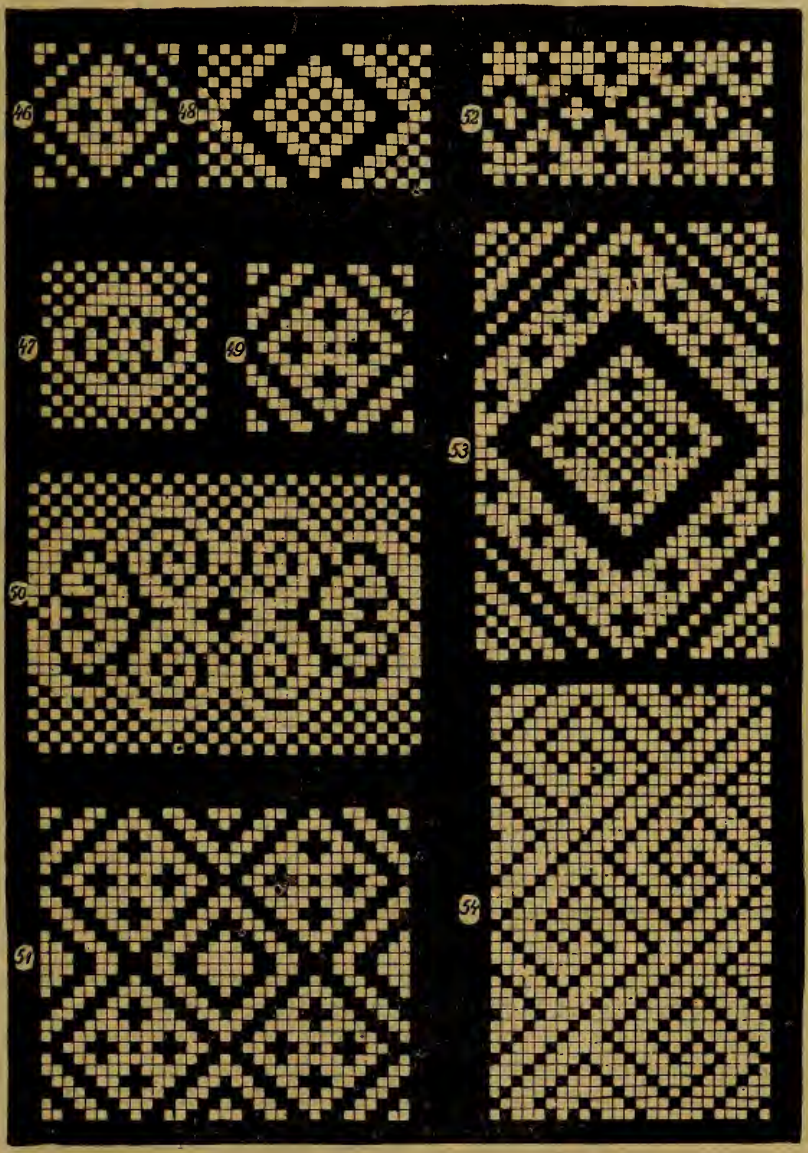


FIG. 1.

A mat partly woven, in the simplest pattern, is shown in figure 1. The black spaces represent the mat or slitted sheet, and the white spaces the strips woven into the mat. These strips are supposed to enter at the lower edge of the mat as placed on the page, always starting under the marginal strip, which is usually wider than the slits. Beginning at the left lower corner, the first white strip goes under not only the margin but also under the lower strip of the mat, then over one strip of the mat and then under one, continuing over one and under the next to the upper edge of the mat. The next white strip goes under the margin and over the first strip of the mat, and then under and over as before, and so the alternation is kept up throughout the design.



DESIGNS FOR PAPER WEAVING.



PATTERNS FOR ADVANCED PAPER WEAVING.

As there are but two possible ways to proceed, either to lift up or press down the mat-strips with the needle, the course of a single weaving-strip is clearly expressed in a simple formula, UP and DOWN, up being indicated by (u), when the mat-strip is thrown up, i. e., when the weaving-strip goes under the mat-strip, and down indicated by (d), when the weaving-strip goes over the mat-strip. The continued repetition of a formula would not, however, produce a weaving pattern, but simply stripes which would slip over each other without remaining in place. To secure a pattern there must be a combination of two or more formulas, and such a combination is called a scheme. The making of formulas is an easy matter, but the combination of formulas into schemes requires considerable skill, ranging from the ability of the kindergarten pupil to the artistic experience of the designer in carpet or other textile weaving.

To illustrate the meaning of a scheme let us turn to the first pattern shown in No. 1 on the page of "Designs for Paper Weaving," which is produced with the scheme 1u, 1d, and 1d, 1u, i. e., one up and one down for the first strip and one down and one up for the second strip. In this way all varieties of patterns are readily expressed by schemes and are therefore easily preserved. In design No. 2 the scheme is 2u, 2d, and 2d, 2u. In No. 3 we combine Nos. 1 and 2 and the scheme is 1u, 2d, and 1d, 2u. Nos. 4 and 5 are other combinations of 1 and 2. If further details of the formulas and schemes involved in mat weaving are desired they may be found in The Paradise of Childhood, which covers very fully all the gifts and occupations of the Frœbel kindergarten.

FIG. 2.

FIG. 3.

FIG. 4.

The illustrations of the most approved weaving needle as shown above indicate how it is used. In figure 2 we have a general view of the needle. Figure 3 shows how the paper is inserted, and figure 4 the threaded needle ready for use.

In threading the needle it may conveniently be held in the left hand with the hook-end away from the body and the opening on the top, the thumb being placed on the spring so that it can be depressed and the throat opened. Take the strip of paper in the right hand, the under side up, and place the end in the open throat by passing it away from the body down the incline of the spring into the throat; then bring the paper in line with

the needle and release the spring. Next pass the right thumb forward under the strip and fold it over the hook of the needle.

Having woven a strip into the mat, in order to release the needle place a finger of the right hand on the end of the strip, near the needle. Then with the left hand turn the needle over, toward the mat, and push away from the mat. Or else slide the thumb and fore-finger of the left hand down to the spring, release it and slip it off side-ways or toward the mat.

A good needle must be easily threaded, must hold the paper strip securely, and must, as far as possible, avoid all projecting corners, on needle or paper, which may catch on the strip of the mat in the process of weaving.

The "Bradley" needle can be threaded with the eyes shut and is strong and durable, being especially adapted to primary schools.

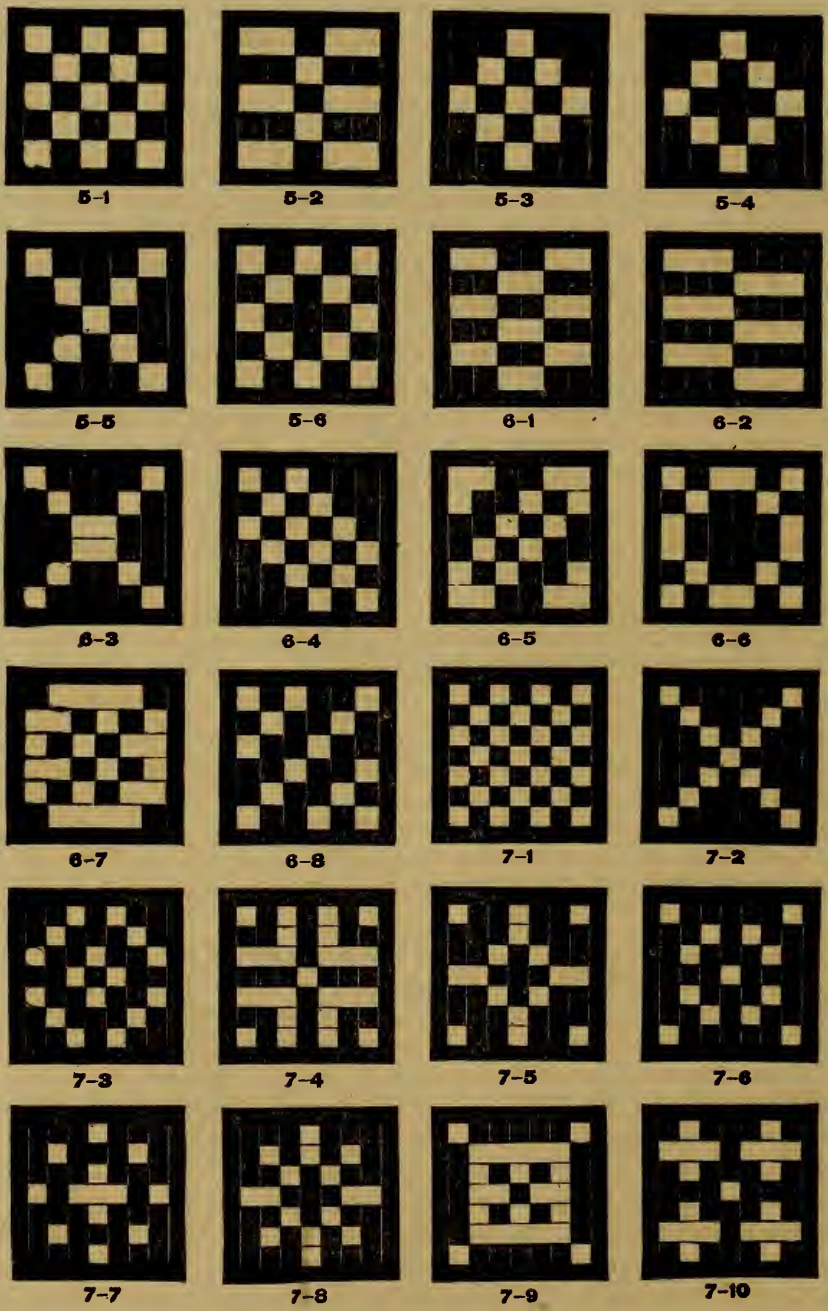
In addition to the "Bradley" weaving needle, illustrated on a preceding page, the "Ball" and the "Improved" needles are accepted as useful weaving instruments by teachers who are practiced in the art.

A mat that has been neatly woven can be finished for preservation by carefully gumming the ends of the strips to the under side of the margins and trimming them off just inside the edge of the mat.

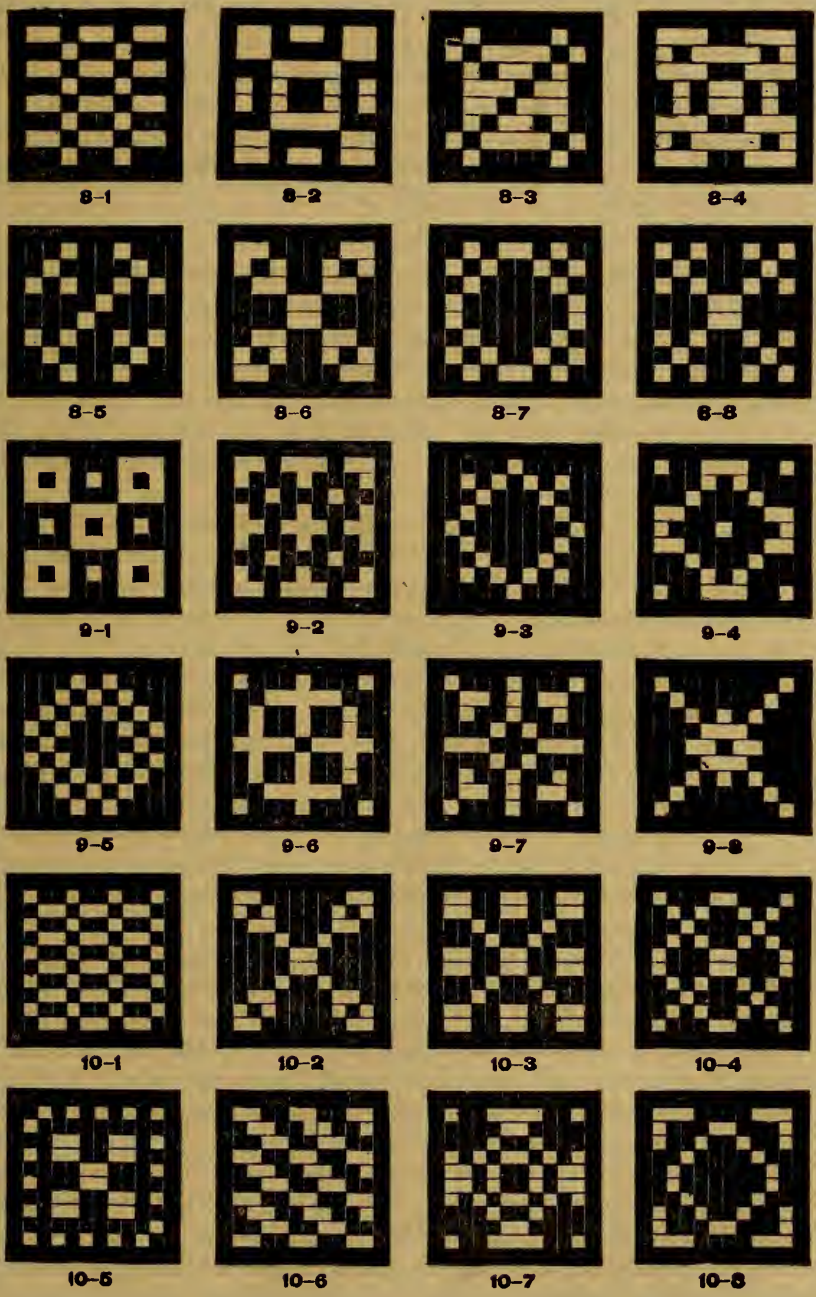
In the use of this material, as with all such work, the methods employed must be modified by the teacher to suit the conditions under which she is working. In some cases class work may be done entirely by dictation, with the help of formulas. In other cases the material should be used as individual busy work from patterns. Both methods are valuable and there may be a difference of opinion as to which is productive of the most good. By dictation the design appears gradually and the child is trained to follow explicit directions. In working from copy the pupil must study out the processes necessary to produce the completed design before him. In both methods the education in color, design and manual dexterity is equally valuable.

The child should at first be directed in the selection of colors, and later should occasionally be allowed to make his own choice, but the results should be commented on by the teacher, good selections being commended and bad combinations criticised, and both made the text for a few words of instruction on harmonies and contrasts of colors. In form and color education no lesson is so effective as the comparison of good and bad work. With young children the colors may be few and decided, and, as the color sense develops, shades and tints can be introduced. Invention in design may sometimes be permitted, after the child has become familiar with the principles underlying the disigns already worked out.

After a little practice the children take great interest in this occupation and can soon learn to make designs which they delight to give their friends. The chief value of all this kind of amusement is that it resolves itself into elementary manual training and greatly aids in the culture of the youthful



Diagrams of Mrs. Hailmann's Graded Mats.



Diagrams of Mrs. Hailmann's Graded Mats.

hand and eye. Two things should always be required in connection with the weaving—neatness and accuracy.

Paper weaving in the ungraded school must be made very simple at first, because of the lack of that personal instruction which is a marked feature of the kindergarten system. The lessons must also be short, so that each one can be finished at a single sitting, while the purpose and thought of the pupil are fresh.

Mrs. Hailmann's Graded Mats.

As the result of long experience in the adaptation of kindergarten methods and material to primary work Mrs Hailmann has devised an admirable series of weaving problems, combining numbers, color and designing, and arranged with special reference to the growing capacities of the child. The scheme includes six kinds of mats, each four by four inches, with a cut surface three inches square. The first is divided into five strips, the second into six, and so on to ten. As the number of strips increases, the width, of course, decreases.

These mats are sold in packages containing sufficient material for a lesson in any ungraded school-room. The colors of the paper are assorted, with the shades and tints of the six colors, and also a gray. In making combinations of colors the teacher should select complementary colors, or else a color with a gray or a color with its shade or tint.

In order to bring the price of these mats within the reach of every ungraded school they are cut in engine colored papers and by putting them up in one assortment they can be made economically in large quantities. But teachers must remember that they cannot be furnished in any other cuttings or colors.

To distinguish this series of mats from the other varieties they are designated by X, the individual numbers also being added, as X—5, X—6, etc. The last figure of the combination shows how many strips there are in mats of that assortment.

As the colors obtained in engine colored papers are not as good as those which can be secured in coated papers, packages like X—10 mats in coated papers and standard colors, with a shade and tint of each and gray, white and black are also sold. These packages each contain twenty-five mats and fringes and are marked Z—10. With this assortment the teacher can give the older pupils better color lessons than with the rest of the series. If larger mats and special varieties of color are wanted an extended line will be found in the regular kindergarten stock, In ordering Mrs. Hailmann's mats teachers should be careful to state that they belong to the X series and also give the number of strips required, or say that "Z—10" is wanted. The simplicity and utility of Mrs. Hailmann's mats, viewed from an educational standpoint, can readily be understood by referring to the page of diagrams which is devoted to them.

CHAPTER IX.

PAPER FOLDING.

In both paper folding and paper cutting, as it is practiced in many of our primary schools, we have one of the most valuable contributions from the kindergarten to the primary school, because it is capable of such extension and expansion that it can be adapted to pupils of different ages and classes and carried up into higher grades than some of the other kindergarten occupations. That the schools of the present day are indebted almost exclusively to the kindergarten for this concrete work is evident to all who are familiar with Froebel's career. He taught the study of things as well as words, and from him has come all the manual work that is now found in the primary grades. This manual work has come down from the work-shop to the higher grades, through the technical and trades schools, and has come up to the primary schools from the kindergarten. And the progressive teachers of this generation, who appreciate these facts, are actively engaged in "forging the connecting link between the kindergarten and the trades schools or the work-shop," working down through the high school and up through the primary and grammar school.

Paper folding has particular interest for teachers above the kindergarten grades because of its direct bearing upon form and drawing and because it also helps develop habits of neatness, exactness, order and observation. While the kindergarten gives the perfect forms for folding, square, circle, triangle, etc., there is no reason why the children in higher grades should not make the forms as well as fold them. By so doing they come to appreciate the difference between their own attempts and the perfect pattern by comparison, and their ideal grows as they surmount difficulties which at the outset were inappreciable to their untrained eyes.

The following scheme for paper folding has reference mainly to its utility in connection with drawing.

We have noticed in stick laying that while sticks are models of the lines which form the outlines of the figures to be drawn, they do not really present the models of the surfaces of forms in two dimensions, and in looking for such a model nothing seems more suitable than a piece of paper, which for added interest may be of some pleasing color and for education in form and dimension may be square and just four inches on each side. Give each child a piece of paper and as far as convenient allow each to choose a color, thus encouraging the will-power in making a selection and giving variety and added interest to the occupation.

The teacher also has a paper, and at this stage in the exercises a little catechising as to form and size and possibly colors may be profitable, the amount and nature of this work depending entirely on the ages and previous condition of the pupils. A kindergarten graduate will know all about it, while another of the same age will know nothing about it. Now let each child make a drawing of the piece of paper, in the center of his sheet of drawing-paper, approximate accuracy being secured by allowing him to lay the piece of colored paper in the center of the sheet and make a small pencil-dot at each corner. For this and many other exercises in primary drawing practice drawing-paper printed with dots in one-inch squares is very useful.

When all the children have drawn the square more or less correctly see that each has done fairly well according to age, helping any who may have been unable to understand the general instructions. Next tell them to fold their paper from side to side, forming an oblong four inches by two inches, and to open the papers ; then ask what new feature appears in the paper or model that was not there before. Then find a seam or crease in each paper, which they have made, each for himself. Now something has been made, they have added something to the model. Tell them to represent that crease on the drawing.

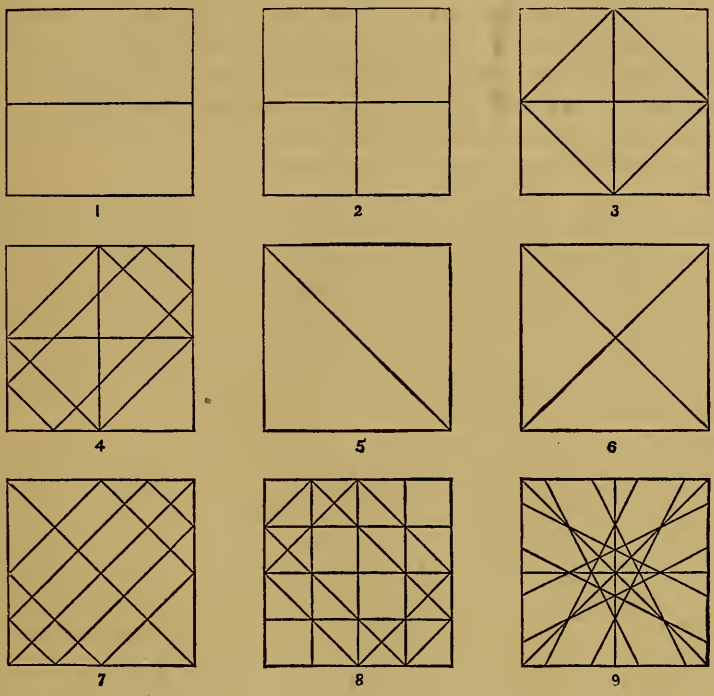
In like manner dictate various other foldings, giving very clear directions which cannot be misunderstood and requiring close attention while dictating ; then give the pupils time to do their work without further talk and with the understanding that the order is not to be repeated until all have had ample time to execute it. Then the teacher may repeat the order, at the same time folding her paper plainly before the pupils so that any that did not understand her may now perform the operation by imitation, and thus keep along with the class.

Very pleasing designs result from successive foldings, as shown in the accompanying diagrams. As many or as few folds may be made as suit the conditions in each case.

Figure 1 shows one fold, from side to side, figure 2 represents the same repeated at right angles to the first. In figure 3, four additional folds are indicated, each corner having been folded to the center. These three figures form a succession of six separate foldings—each to be made independently. In figure 4, four folds are added to figure 3, two of the corners being folded to their opposite diagonals and the other corners to their own diagonals.

This folding will be readily understood by trial, but is one of the most difficult for the children to execute correctly and ought not to be used until after figures 7 and 8. With the above explanations figures 5, 6 and 7 will be readily understood. Figure 8 is developed from figure 3 by folding each side to the center lines, making four foldings, and then making the same folds as described for figure 4. This figure, although more

complicated than figure 4 is less difficult, because the four diagonals have been bisected by the rectangular folds, thus giving definite points at which



to space the corners in making the two long diagonal folds. Figure 9 is seemingly complicated, but the following method of folding is by no means intricate :—

To figure 2 add the foldings of figure 6, and then fold each corner to the center of the opposite sides. Thus the lower right-hand corner is carried to the center of the top side, and then to the center of the left-hand side. These two folds applied to each corner, making eight in all, complete the figure. The drawing of this figure is very simple, after the sides of the square are first accurately divided into eight equal parts of half an inch each. It is not very difficult, with the dotted paper in one-inch squares, even without any measurements, and the necessary one-half inch spaces can be accurately obtained if the use of a rule is allowed.

All these figures should be folded and drawn by the teacher before dictating to the children, that all the difficulties may be encountered in advance. Figure 9 should not be attempted until all the others have been well mastered by the pupils. Circles and equilateral triangles may follow the squares for variety, but the square is more simple and useful, although the circle gives opportunity for lessons on the angles. The amount of instruction in form and color that may be worked out of a lesson of this

kind is very surprising to one who has never given any thought to the subject.

Ready-cut material for paper folding consists of square, rectangular, triangular and circular pieces. Some of it is made from paper that is stained throughout its entire thickness, being alike on both sides, known as Engine Colored paper, while the balance is Coated paper, one side being colored and the other white. The coated papers have brighter colors than are possible in the engine colored varieties.

The papers are cut very accurately, so that when they are folded the lines and corners will correspond, which is a necessary condition to secure correct work from the pupils. They are sold in packages of one hundred squares, each being four by four, or one hundred equlateral triangles, four inches on the side, or as many circles, four inches in diameter, all three in engine colored papers, these same lots being duplicated in coated papers. The same papers may be bought in full sheets or accurately cut to other sizes, if ordered in quantities.

What has been said in this chapter about paper folding may serve as a hint of its possibilities to inquiring minds, but must not be regarded as an adequate exposition of the subject. A skillful manipulation of the papers under the nimble fingers of children who are wisely directed will produce many artistic forms, as well as copies of baskets, pocket-books, shopping bags and not a few articles which figure prominently in real life. The possibilities of this occupation are well set forth in a book on "Paper Folding and Cutting," published by Milton Bradley Co.

CHAPTER X.

PAPER CUTTING.

In the kindergarten, paper cutting is based on the previous folding, so that the cutting produces a series of units, and then the best results depend on the proper mounting of the several pieces to form an artistic and symmetrical figure. For schools the possibilities of this Frœbel occupation are unlimited, when the teachers become interested and experienced in it. In this mounting of the various units the artistic combinations of color are most important and the opportunity for imparting and testing color-sense is all that could be desired.

The material for paper cutting in a school which includes all grades is colored and white paper, a pair of scissors for each child and occasionally a pin. The best way to secure the scissors, when they are not supplied by the city or town and the teacher does not choose to meet the expense herself, is to levy a tax of five cents for the use of scissors on each pupil in the school. When children bring their own scissors all kinds and sizes may be expected and every kind of work will result. When the pupils are allowed to bring their own, each pair should be marked by attaching to one of the handles a tag bearing their owner's name. Time is saved if the scissors belonging to each row of seats are kept by themselves, either in boxes, cloth cases or bundles fastened with rubber bands. While not in use during the exercises they should be laid on the right-hand side of the desk.

Children cannot use scissors handily without being taught, any more than they can a knife and fork. They must be shown how to put the thumb and middle finger into the right and left handle of the scissors, and as preliminary practice for this work, it is well to let them acquire facility in the use of this new tool by cutting colored and black and white pictures from cards, illustrated newspapers, magazines, etc.

Paper cutting when it is made a part of the study of the geometric solids becomes a means of expresssing the shapes of the faces. The fact that each face of his cube is square impresses itself on the child's mind when he cuts six squares of paper to fit the faces of the cube. The first aim of these cutting lessons from faces is to fix the facts of shape, and the child should at the same time observe closely and express accurately what he discovers.

Suppose the square prism has been modeled in clay by the youngest children and the faces are to be studied. Each child has a prism two

inches by four and a strip of paper two inches wide and of indefinite length. Find an edge of paper that fits an edge of the prism, fold the paper on one face, crease and cut. Repeat this operation for the other three oblong faces of the prism. Let the children discover that one oblong face will give the end faces and cut these faces from a fifth oblong. Develop the idea of pattern by fitting these six faces about the prism and then laying them so that they will make the pattern of the prism. Later on, the shapes of the faces may be cut by looking at the solids and cutting to express proportion. The scissors may be used in these exercises as freely as the pencils.

Experience proves that elementary designing in the primary and lower grades is best taught by the use of colored papers. In this line of work units are thought of as wholes and their beauty or defects stand out as they never do when they are built up by drawing only. If we watch a class arranging a pattern of paper units according to the simplest principles of design and another class who merely draw their units, meanwhile erasing their work and trying this and that effect, we can readily decide as to the advantages attending the use of colored papers in designing. Elementary designings may be defined as an exercise in arranging given forms in new and original combinations. The simplest principles of design to be taught and illustrated in the work of the children are repetition, repetition and alternation, repetition around a center, repetition to cover a surface, the character of the design to be determined by the position of a surface. Walter Smith says that one of the greatest faults of elementary designing is over-elaboration. The desire to beautify by multiplying lines and figures must be guarded against, first, last and always.

In teaching elementary designing the teacher should first select the form to be filled either by giving out a background of suitable size for the units which she proposes to use, or by drawing the outline of the background. This rule should be observed even when the youngest children are pasting together borders of parquetry or rosettes. The best backgrounds for repetition around a center are squares, quatrefoils, triangles, trefoils, hexagons, octagons and circles. Backgrounds must be well-covered by units, but should not be crowded. The units ought to occupy about two-thirds of the inclosed space and should not come quite to the edge of the background.

When units are repeated about a center they must be held together by a central form. This center gives unity and strength to the design. If the center simply touches the units the whole design must necessarily lack that strength found in a design where a small part of the unit is covered by the center. The diameter of the center should be about one-fifth of the diameter of the background. When units are repeated horizontally the character of the unit determines whether they need to be held together.

When units are repeated around a center the same number must govern every part of the design. A square having four sides requires four or eight units, and its center must also be divisible into four or eight equal parts. A circle is a suitable center, as it may contain any number of axes of symmetry. In hexagons, triangles and trefoils three or six units may be used with corresponding centers. Many good designs, even with teachers of experience, are spoiled by violations of this rule, because the child thinks it is a stroke of genius to place a hexagonal center on a square background, or a pentagon on a triangle.

The plain figures found in the solids are the first units to be considered in designing with colored papers. The parquetry circles, squares and triangles can be used with the youngest children, but in the second year the pupils should cut their own units. The teachers will be saved much time and trouble if packages of squares four or five inches in size be provided. If the whole square is not needed the material can be divided so as to be used economically. The circle, square and triangle should be followed by other symmetrical units. The rhombus, kite-shape and oval are excellent elementary forms, capable of many modifications. In modifying kite-forms conventionalized forms of natural leaves may be used.

Lessons should also be given on cutting units. From oblongs of paper, proportion two by three, the teacher can first cut a few kite-forms while the class look on, meanwhile suggesting by her work some variations, and then she can provide each child with an oblong and let them do the cutting for themselves, making such criticisms as seem desirable.

In making surface designs it will be necessary to decide at the outset whether the surface is to be viewed in a vertical or horizontal position and to divide it into equal geometric spaces. Each of these spaces will be the background or field of the design. The top views of flowers, enlarged so as nearly to fill these spaces, are good units for these designs. Suppose, for example, that the surface is divided into squares, the top view of the syringa can be used to advantage. In triangles or hexagons the trillium, with its three petals finds an appropriate place, while any number of petals can easily be introduced within a circle, provided they are placed regularly on the surface. Sometimes the pattern is brought out well by grouping the units so near each other as to leave but little background exposed, while other units call for more visible background.

While the use of colored papers affords the best means of teaching pupils to arrange "given forms in new and original combinations," it also gives to the average teacher her best opportunity to teach standard colors, shades, tints and hues, and to develop taste in combining colors. For an exhaustive treatment of these themes, paper folding and cutting, as well as the teaching of color, the reader is referred to the special books relating to them, which have been already mentioned.

CHAPTER XI.

DRAWING AND DRAWING IMPLEMENTS.

Fifty years ago writing was the only manual occupation taught in the public schools of this country. Twenty-five years later some progressive "cranks" advocated the teaching of drawing—the only universal language —at public cost. But the teachers and school boards could see no place for the introduction of the "ornamental arts" in a course of study already overcrowded, and so went on with the established mental gymnastics in grammar, arithmetic and geography. Gradually a little drawing, in its least practical forms, was allowed to creep in, with great fear and trembling Although mechanical and constructive drawing were admitted to be the most important it was supposed that only the ornamental and decorative could have a legitimate place in the school-room.

Now the study of drawing is usually pursued on a much more scientific basis and its importance is everywhere conceded. If the methods of form study laid down in the early part of this work have been faithfully followed much has already been done in preparing the pupil to take up drawing. The main thing aimed at in teaching either free-hand or mechanical drawing is to make each line mean something. Unless the lines are alive with meaning the work has neither practical nor educational value. The handling of solids by each pupil is an absolute necessity in free-hand drawing, because each one must discover with his own eyes the appearance of the edges to be represented. When a single model is placed before a class the pupils reason as to its appearance under imagined conditions, they do not see for themselves. Consequently the results from such teaching are but little better than copying would be. Drawing is the language in which the facts of the form to be made are stated, and the pupil must so thoroughly master the langnage of those facts that he can reproduce in wood or metal the form described by the drawing.

As in teaching of writing so in giving instruction in drawing, the use of some standard system of text-books is recommended. But in addition to such a system various helps are essential, some of which are named in the pages immediately following.

Practice Drawing Paper.

This is a tinted paper with fine pencil surface, on which is printed guide dots and lines, for pupils beginning to draw with lead pencils, each sheet being five inches square, with a four-inch surface for the drawing. This paper is designed to aid in teaching the children to move their pencils

properly, as soon as they have learned that edges in the solid may be represented by lines on paper. Many teachers have found that when plain paper is used under such circumstances half the time of the lesson must be spent in getting the class ready to draw in the same place at the same time. When this paper is used they will do well to remember that the pupils are simply learning to handle pencils.

This paper is printed in two styles, No. 1 being for the practice of those children who are drawing straight lines, and No. 2 where circles are required. Both contain a series of dots, placed one inch apart, in squares, and in one corner of No. 2 is printed a circle having a diameter of two inches. To teach verticle lines, with No. 1, for instance, proceed from first-upper point to first lower-point, moving over the intervening space without stopping. The horizontal and diagonal lines are drawn in the same way. See that fingers and wrists do not move, and that the whole arm is brought toward the body with a steady, sliding motion. This style is also employed to advantage in working angles and in dictation exercises.

With the second style of paper the printed circles are to be used on the same principle as in a tracing-book. After moving the pencil over the circle many times, the same motion, guided by the dotted lines on the other part of the sheet, will produce very good circles, even in the hands of young children.

When these simple exercises can be done with a reasonable degree of success on the printed papers, similar pieces of plain paper may be substituted, on which pupils must judge of distance without the aid of the guide dots.

These papers are utilized as practice paper to suplement the regular systems of drawing, or may be used in the lowest grades where no other drawing exercises are introduced.

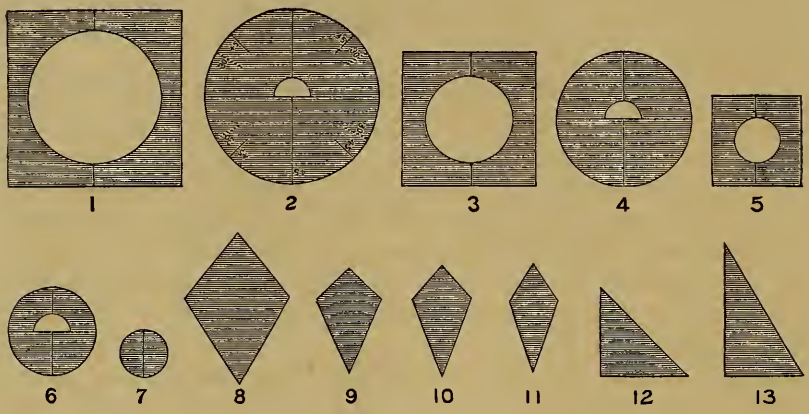
The Primary Drawing Tablets.

All drawing is commonly divided into two classes, free-hand and instrumental or mechanical. In free-hand drawing no instruments, such as compasses, rules, etc., are allowable, while in mechanical drawing anything is permissible which helps secure the necessary accuracy, and proficiency in free-hand work is also a valuable acquisition and one that is often called into use.

Decorative drawing is the making of artistic forms for the decoration or ornamentation of any object. As decorations or ornamental figures are very largely governed or bounded by geometrical figures, while the actual lines of the ornament must be free-hand, decorative drawing combines both free-hand and instrumental drawing. Simple decorative drawing can be made a very pleasing and valuable occupation for the little children and utilized as a high grade of busy work in the primary schools, even though there is no time for any extended instruction in this line.

Bradley's Primary Drawing Tablets provide the young child with a per-

fectly harmless and very serviceable set of instruments for simple busy work, and also for establishing the working lines and geometrical figures within which to draw ornamental designs.



There are 13 of these tablets, as shown above, made from a very hard and finely-polished paper-board, which is exceedingly durable. The list follows :—

No. 1.—4-inch square, with 3-inch hole.
No. 2.—4-inch circle.
No. 3.—3-inch square, with 2-inch hole.
No. 4.—3-inch circle.
No. 5.—2-inch square, with 1-inch hole.
No. 6.—2-inch circle.
No. 7.—1-inch circle.
Nos. 8, 9, 10 and 11.—four kite-forms for locating units of form.
No. 12.—45° triangle.
No. 13.—30° and 60° triangle.

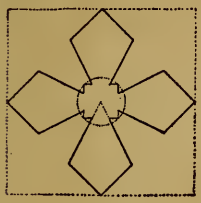
No. 1 may be used for drawing a 4-inch square by marking around the outside of the tablet. The center of each side is indicated on the tablet and can be marked on the four sides before the tablet is removed from the paper. By using a ruler, lines can be drawn from the center of one side to the center of the opposite side, and also from corner to corner both ways, so that all of these lines will cross at one point. To do this accurately is no small problem for little hands, and the educational value of such work when successfully done is clearly manifest.

No. 2 is a 4-inch circle, with a semi-circular hole at the center, two diameters of the circle being printed on the tablet, at right angles to each other, dividing the circumference into four equal parts and exactly locating the center of the circle. The circumference is also graduated to form a protractor for marking the common angles of 90°, 60°, 45° and 30°. With this single tablet a perfect equilateral triangle, square, hexagon, or octagon may be inscribed in a circle four inches in diameter.

Nos. 3 and 5 are similar to No. 1, but are three and two inches square respectively.

Nos. 4 and 6 are smaller duplicates of No. 2, except that only the angles of the quadrant are indicated.

Nos. 8 9, 10 and 11 are kite-form patterns for determining outlines for the units in a mutiple design or figure to be inscribed in a polygon. Nos. 12 and 13 are two draftsman's triangles, to be employed in connection with a foot-rule, or other straight edge, in general work.



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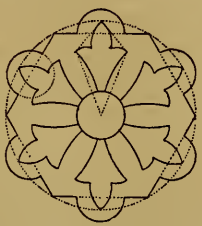

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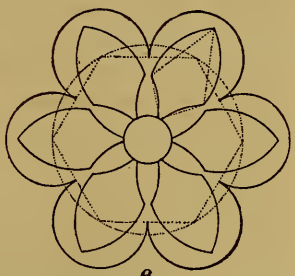

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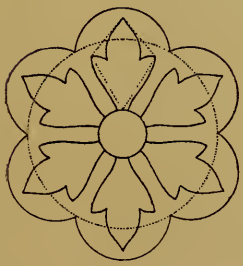

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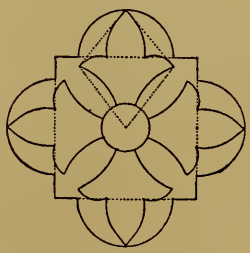

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The above figures illustrate a few of the designs which can be made by using the tablets. The dotted lines in these diagrams represent the construction lines which the tablets provide and the solid lines show the completed designs. In No. 1, to take the simplest illustration, the outline of the square is made by laying a square tablet on paper and marking round it. The center of each side of the design should then be indicated by placing a dot opposite the four cross-lines on the tablet. By removing the tablet and connecting the dots that are opposite each other with straight lines and also drawing diagonal lines from corner to corner, the center of

the design is obtained, being at a point where the lines cross. With tablet No. 5 draw a 1-inch circle at the center of the square, which is readily located by bringing the cross-lines to correspond with the lines already drawn on the paper from side to side of the square. The points where the circle intersects the two diagonals of the square indicate the corners of the small square which joins the four units of the design.

We make design No. 2 in a similar way, but kite-form No. 10 of the tablets is used as a guide for the four units of the design, which are drawn free-hand, the kite-form being drawn in four times, as is shown by dotted lines in the upper quarter of the design.

To draw No. 3 use tablet No. 2 for the outline circle, which is divided into three equal parts, as follows: Lay the tablet so as to bring the diameter of the central semi-circle on a horizontal line, as shown in the illustration of the tablets; then make a dot at the top of the vertical diameter and another at each of the 30° divisions in the two lower quadrants; draw lines from each of the points to the center of the figure; on each of these radii as a diameter draw a 2-inch circle with tablet No. 6; also draw on the same lines the three kite-forms with tablet No. 10; on these kite-forms inscribe free-hand the three units of the design as shown, connecting them at the center by the 1-inch circle. In order to locate this central circle exactly, two diameters should have been drawn at right angles to each other when the large protractor tablet was in place. But the circle can be located very closely by the eye, without these lines.

No detailed explanation of the operations involved in drawing all the designs shown will be necessary, because a study of the figures will indicate how to do those which have not been mentioned. All of the nine designs and a multitude of others can be accurately drawn with the tablets. In No. 9 a slight modification in the use of the kite-forms is introduced to show that it is unnecessary that the inner point should always come exactly at the center of the circle, but may be placed anywhere on the extension of its radial line. The kite-form is indicated once in each design, as are also a few of the construction lines. To avoid confusion in the finished drawings the construction lines should be made lightly and the finishing lines much more boldly. A careful study of the examples already given will suggest many other designs which can be formed with equal facility by using the tablets.

It has been urged that free-hand drawing should precede all mechanical or instrumental drawing, because of the training which it gives the hand. While it is true that the attempt to draw all geometrical figures free-hand is good, simply as practice, yet the moment such figures are made the basis of other work they must be constructed with accuracy, otherwise they become a frightful source of error. If a decorative artist wishes to place a design within the bounds of a square, a triangle or circle, or any combination of these or other geometrical figures, he first lays out the geomet-

rical figure and divides it with the proper instruments, square, compasses, ruler, etc., for the attempt to draw any of these figures by free-hand would be a miserable failure. Consequently it follows that to ask a child to draw a square and inscribe a circle therein by free-hand and then add some decorative design is demanding of him more than an expert artist will attempt, while to encourage him to believe that, at his best, the result is satisfactory is doing him an injustice and cultivating a slovenly habit.

The Springfield Support For Drawing–models.

While the elementary principles of free-hand and mechanical drawing may be for a time taught side by side without any special tools beyond the foot-rule and the pencil, the two paths very soon diverge so decidedly that it is useless longer to combine them. Hence it follows that special tools must be provided for the mechanical work. Certain instruments have been found necessary for accurate and rapid work by draftsmen, and many drawing teachers believe that these same instruments in their simplest forms should be placed in the hands of the pupil at the beginning of his course, instead of letting him blunder along without them until he reaches the higher grades. Now that form study has become an acknowledged and legitimate branch of every well-devised school course there is a necessity that the pupils' desks shall be properly equipped for the pursuit of this study, which is equally urgent with the demand that they shall be supplied with conveniences for writing.

The Springfield Support for Drawing-models, shown in the above illustration, can be readily adjusted and also removed from the desk at pleasure. The neat wooden table on which the models lie, within easy reach of the pupil sitting at the desk, is supported by a wooden rod which passes through a hole in the top of the desk and also through the shelf underneath. A metallic cam attached to the top of the desk, at the corner opposite the ink-well, holds by friction the rod and the table at any desired height. The table can quickly be removed from the rod and may be placed in the desk, or collected with those from the other desks and kept in a

suitable cupboard when not in use. The rod is then dropped to the level of the desk-top, so that nothing is seen above the desk. This device will be found particularly valuable in those schools where two or more pupils have to draw from the same set of models at the same time.

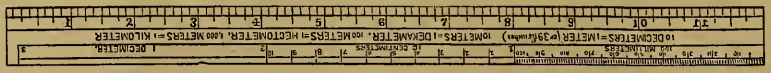
The School Rule.

The elementary principles of drawing may for a time be taught side by side, without any special tools, but very soon the two paths diverge so decidedly that it is useless longer to combine them. Certain instruments have been found necessary for accurate and rapid work by draftsmen, and many drawing teachers believe that these same instruments in their simplest forms should be placed in the hands of the pupil at the beginning of his course, instead of letting him blunder along without them until he reaches the higher grades. The School Rule is made of hard wood, graduated in sixteenths of inches, and in every way well-finished. There is nothing like it for standing the ordinary wear and tear of school-room service and giving the children in the primary grades an accurate idea of a foot.

The Mechanic's Scale.

One edge of The Mechanic's Scale is divided into sixteenths of inches, for ordinary use. On the other edge are twelve different divisions, from 5 to 54, accurately engraved by a screw machine, a variety found elsewhere only on expensive scales of the mechanic or draftsman. This rule is a very convenient help in any school-room, being especially useful in giving the children a definite idea of the minute fractions of an inch.

The International Rule.



On one edge of this rule inches and eighths are printed and the other edge contains the metric measure, while in the center is found the metric measures for long distances. The rule is valuable as a constant presentation of the principal quantities in the metric system, where it is taught, and gives a ready comparison of the two lineal measures.

The Springfield Industrial Drawing Kit.

Every draftsman finds a drawing-board a T-square and one or more triangles as essential to his work as are the scale of inches and the compasses, and the Springfield Industrial Drawing Kit has been devised to meet the wants of both the professional draftsman and the school pupil of any grade who aspires to mechanical drawing.

As shown in Fig. 1 the No. 1 kit consists of a board about ten by twelve inches, to which a pad of drawing paper is fastened, and a wooden T-square and triangles of suitable size. The draftsman or architect at-

taches the piece of paper on which he is working to his drawing-board by means of thumb-tacks, but this method has proved both expensive and annoying in the primary grades, and so the scheme of the pad has been devised. This pad is slightly glued to the board at each corner and the sheets composing it are torn off, one by one, as fast as they are used.

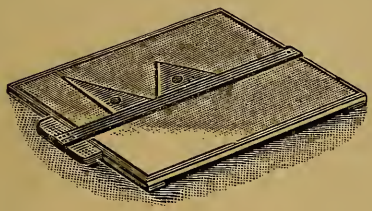


FIG. 1.

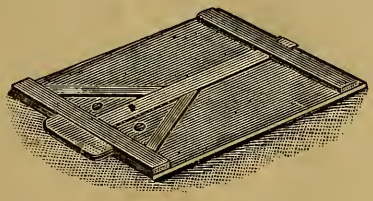


FIG. 2.

The pads are sold separately from the boards and can be renewed as often as circumstances require They are made of a special light-tinted paper, with a good pencil surface, which has a reasonable good "tooth," and will take ink and bear the use of the rubber fairly well. The T-square is a substantial instrument, having a blade fourteen inches long. The head is adapted for use with the pad, as well as the single sheet, being unusually thick, so as to allow it to have a hold on the board when the pad is of full thickness. The two triangles, commonly called the 45° and 60° triangles, include all the standard angles, 90°, 45°, 60° and 30°, ordinarily needed by draftsman, and every child in the primary school should be intimately acquainted with them. The No. 1 kit is particularly designed for pupils below the high school grade. The No. 2 kit is nearly double the size of No. 1, and is sold without pads, being intended for professional draftsmen and advanced pupils.

As a convenience in keeping the several pieces of the set together the back of the board is provided with grooved cleats and the cross cleats at the two ends of the board are slotted to receive the tongue of the T-square, so that when all the pieces are in place they are securely locked together, as shown in Fig. 2. This device makes it impossible for any of the parts to be lost or broken while the board is not in use, provided they are properly packed in their places.

THE WOODEN COMPASSES.

The work of constructing a circle on the blackboard, if of any value, must be done mechanically, hence the need of blackboard compasses in the ungraded school-room, as well as in the higher grades. Consequently every school-room should have a good pair of wooden compasses, with patent adjustable crayon-holders so constructed that either leg will hold a crayon or a point. These points are reversible, one end being tipped with rubber and the other with a sharp piece of metal, this arrangement giving a choice of ends to be used so that no injury shall be done to the blackboard.

The "Matchless" Pencil Compasses.

The need of compasses that are compact, durable and inexpensive, so that they can be put in the hands of each pupil in the intermediate grades of school, is apparent to every teacher of mechanical drawing. Good school-compasses must embody in a cheap form the general features of the professional draftsman's instrument. The correct method of handling this tool with the thumb and fingers in striking a circle, shown in Fig. 1, cannot be acquired with the awkward, makeshift attachments to pencils which are put on the market in the name of economy, but which must be classed educationally as abominations. The joint in a draftsman's instrument shoud be adjusted to an easy friction, sufficient to hold the points in position without other attachments; and this same element should be a part of the school-boy's compasses, so that he may acquire the necessary delicacy of touch which will be invaluable to him later on in his work.

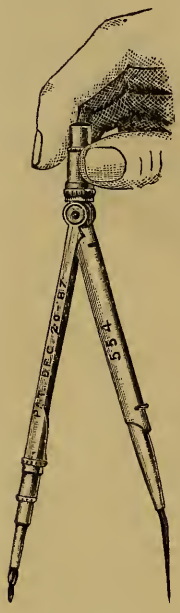


Fig. 1.

Fig. 2.

The claim is made for the "Matchless" Compasses that it is the cheapest and best instrument in the market, and combines more good points than any other. It is made of the best nickel, is provided with a rubber in the head, has an adjustable pencil attachment, and is also a perfect pocket instrument, taking up no more room when closed than a moderately long pencil. Fig. 1 gives a view of the instrument in use and Fig. 2 shows it folded together, with the point protected.

The Beam Compasses.

This instrument is devised to meet the demand for durable compasses at a low price. It is in some respects superior to the other forms and is given a place here in the hope that something more convenient than a bit of string for drawing a true circle may be provided for every school-room in the land. The length of the circle's diameter is regulated by moving the crayon-holder up or down the side.

A Graduated Yard-stick.

A good hard-wood yard-stick, graduated down to inches and eighths on one side,affords a light, convenient ruler and accurate measure at small cost. This article will be of service not only in drawing but also in number work, where frequent measurements are required.

The Springfield Pantograph.

The present educational methods create a general demand for various conveniences for copying engravings and drawings when the subject to be copied must be enlarged or reduced. For blackboard work many small engravings from books of geography, botany, geology and other branches of natural history can be used to advantage, provided they can be accurately and conveniently transferred to the board.

For enlarging and reducing all kinds of diagrams and engravings, no appliance is as simple and as accurate as the pantograph, illustrated by the accompanying cut, which represents this instrument in use for enlarging a map of South America.

Teachers who wish to place on the blackboard an enlarged map or other diagram selected from some book, magazine or newspaper can first outline it in the size desired on a piece of manilla paper. Then by putting the paper over a piece of thick cloth, enough holes can be readily pricked in it with a perforating needle to give the necessary guide-points for transferring the design to the blackboard, the paper being by this process transformed into a blackboard stencil, equal to any of the most-approved make.

In case the teacher wishes to enlarge a picture from a book which can not be laid flat on a table or board, she can first "trace" it by holding a piece of tracing paper over it, and then carefully outlining it on the paper with a pencil sharpened to a good point and not too hard. This tracing can then be fastened to the table or drawing-board and easily enlarged by the pantograph.

The Pantograph is an old and well-known instrument, but the general introduction of graphic methods in modern instruction has renewed the demand for its manufacture in a practical form and at a moderate price.

The Springfield Pantograph is not a roughly-constructed toy, such as have hitherto been in the market, but is an accurate instrument, in the mechanical construction of which no care has been spared to make it serviceable. The holes in the bars are correctly spaced, drilled to fit the thumb-screw pivots and numbered to indicate the proper adjustment for any required size to which the design is to be enlarged or reduced.

As regards certain details of construction and for conveience of manipulation the Springfield Pantograph is superior to anything of the kind which has ever been offered the public, even at a much greater cost.

Each instrument is accompanied by carefully-prepared directions for use.

CHAPTER XII.

NUMBER WORK.

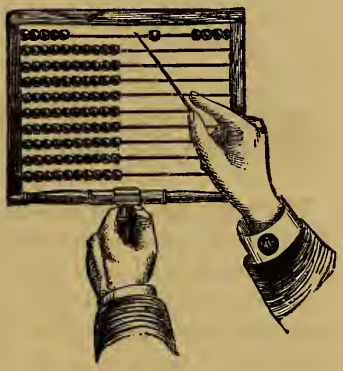
Any school exercise pertaining to the science of number, in its ramifications, if the reader will allow the term, is classed under number work. The teaching of little children how to tell the time of day from a pasteboard clock dial can conveniently and, as we believe, logically be regarded as a series of number lessons, although quite different from any of the common applications of the multiplication table.

The exchange of toy money and the playing of games of mimic merchandise by the pupils unquestionably come under the same head. Consequently it will be seen that this department includes everything from the handling of sticks, beads, pegs, etc., up to illustrating the principles of cube root and the manual demonstration of surfaces, weights, measures and solids.

The best material employed in teaching the child to make quickly many of the simpler combinations which illustrate the four fundamental rules of arithmetic also helps to teach form and color. Because a knowledge of form and color greatly assists in the expression of ideas the teaching of these qualities is made an important part of language work. In fact language work, form study, the teaching of color and number work can be brought together constantly to their mutual advantage, and it will be noticed in the descriptions of aids to number work which follow that the attempt is made to impart ideas of form and color through many of them, as well as ideas of number. On the other hand it is equally evident that much of the material which we have considered in the previous chapters is fully as well adapted to illustrate the fundamental principles of number as to aid in form study or serve as busy work. Take the inch-cubes, for instance, or Mrs. Hailmann's beads. The latter may be used for a great variety of operations within the limits of one and ten and one and twenty; in counting by ones, twos, threes, fours and fives, etc., in analysis and synthesis of the numbers two and ten; in the making of addition, subtraction, multiplication and division tables. Through this occupation, moreover, the child can readily perceive the harmonies and contrasts of the colors as they are explained by the teacher. These exercises may be dictated or indicated on the blackboard, read or reduced to slate-work from the strings. Work of this character can be done profitably during the first average school-year and need not be given up altogether during the second year. Aside from the counting, just alluded to, it is better not to carry the exercises beyond ten with the little children.

Kendall's Chromatic Numeral Frame.

After using the beads for a time the teacher finds that more flexible material is needed for calling up more promptly and in quicker succession images of those number perceptions in the mind of the pupil which the handling of the beads has helped to form, according to Prof. Hailmann. In other words, the pupils must be led "from the mere desire for playing with numbers of pretty things to a real interest in number as such."



For this purpose a wise teacher will choose the balls. "They represent the most mobile of the three bead forms and are least weighted with form features." The Abacus, or Numeral Frame has long been one of the most generally used devices for teaching children to count and also apply the principles of addition, subtraction, multiplication and division. The balls in the Kendall numeral frame, shown in the accompanying cut, are nicely turned from hard wood and are in the six standard colors, being polished so as to produce a beautiful effect.

The idea of using the six colors in the numeral frame was the happy thought of Mr. George M. Kendall of New York City, and its development in the present form renders the article bearing his name unquestionably the best in the market.

Large Pegs For Counters.

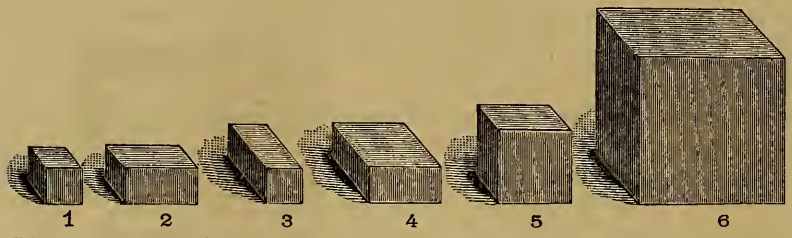
Attention is called in this connection to what is said in Chapter IV regarding papers and straws for stringing and pegs and peg-boards. Aside from the pegs there described many wide-awake teachers who are constantly on the alert for new objects to help them in number work are using a line of large wooden pegs an inch and a quarter long, and an eighth of an inch square, made to represent a mammoth shoe peg and sold in the six colors at a price which makes them the cheapest counters that can be bought.

Primary Counting Blocks.

While blocks for counting, of various sizes and forms, bearing no relation to each other, have been long in use, the design of this set is not only to serve as *counters* for the child, but also to teach form, size, comparison of volume, composition and division or analysis.

A child can examine, handle and count blocks of exact dimensions just as readily as he can those of indefinite size. He can comprehend an inch, a foot, a yard, and become familiar with those terms and what they mean as well as he can comprehend a block of meaningless dimensions. An appreciation of this truth has led to the preparation of a set of 242 blocks of exact dimensions, as indicated by the following list:—

48 pieces of No. 1, which is a quarter brick, ¼ in. x ¼ in. x 1 inch.
48 pieces of No. 2, which is a half brick, ½ in. x 1 in. x 1 inch.
48 pieces of No. 3, which is a half brick, ½ in. x ½ in. x 2 inches.
48 pieces of No. 4, which is a whole brick, ½ in. x 1 in. x 2 inches.
48 pieces of No. 5, which is a 1 inch cube.
2 pieces of No. 6, which is a 2 inch cube.



The whole set, with directions, is nicely put up in a strong, finely-polished wooden box, with partitions, and the following suggestions for using the blocks will be found of service :—

With very young children.—For the first few days the teacher should have the pupils handle the blocks merely as counters. Let them count ten of No. 1 and then ten of No. 2. Put each size in a separate group. Then ask the children, How many groups have you? How many blocks in a group? How many blocks in all? Now make another group of No. 3 blocks. How many groups have you now? How many kinds of blocks? How many blocks in all? Thus proceed until 200 blocks are used, repeating questions similar to the above with each additional group. Now, How many No. 1 blocks have you left? How many No. 2? No. 3? No. 4? No. 5? How many blocks in all? In this way use all the blocks in the set as counters.

To teach size and measure.—Show the children that No. 1 blocks are just one inch long. Lay 12 of them end to end and thus make a foot; 36 of them and make a yard. Ask them what folks buy by the yard. Ask them if tea, coffee, sugar, candy and molasses are sold by the yard. Tell them to find out all the things that are sold by the yard and see which child can tell you the most things the next day; then write on the blackboard the list which each pupil brings in, and talk about the things thus named. In this way you will get many subjects for little stories. Next place the No. 3 blocks end to end and see how many will make a foot, a yard. Then put them side by side and ask the same questions. Do the same with Nos. 2, 4 and 5.

To compare volume.—Two of No. 1, placed side by side, equal No. 2; placed end to end equal No. 3, hence there is the same volume in No. 2, as in No. 3. Place two of No. 2, side by side, and you have No. 4. Place No. 2 on top of No. 2, and you have No. 5, hence No. 4 has the same volume as No. 5.

To teach composition.—Put four No. 1's together and make cube No. 5.

Put 8 No. 5's together and make cube No. 6. See how many of No. 4 it will take to make No. 6. Call the attention of the children to the fact that since No. 4 and No. 5 have the same volume it will, of course, take 8; thus you begin to develop the reasoning faculties, Make a No. 6 cube of No. 3's, also of No. 2's and No. 1's, and inquire how many of each it requires.

To teach division.—Having made as many No. 6 cubes as the different sizes of blocks will allow—using only one size in any one cube—proceed to divide these composition cubes by 2, by 4, by 8, by 16, by 32, and then you are prepared for a lesson in fractions. Form a No. 5 cube with two No. 2 blocks and give a lesson on one-half, then proceed with a cube No. 6 formed of No. 5's and give another lesson on one-half, then on one-fourth and then on one-eighth, and so on with the different composition cubes almost indefinitely.

A few questions like the following will suggest others and start a train of thought in the mind of a little five-years old that will produce surprising results: How many blocks 1 inch square are required to make a block 2 inches square? 3 inches square? 4 inches square? How many 1-inch cubes are required to make a 2-inch cube? a 3-inch cube? How many 6-inch sticks of timber can be made from a 12-inch stick? How many 4-inch? How many 3-inch? How many 2-inch? How many 1-inch? These test questions, with many others of similar nature, can be easily understood after the little people fully comprehend the use of the blocks.

How To Teach Number-writing With The Sticks.

The writing of numbers by the children is recommended during their first year's course, just as the writing of words and sentences is considered desirable early in their language work. And the use of sticks, already explained as a part of form study, will be found valuable in teaching numerical proportions.

While the child is learning to count he should be impressed with the fact that however large a number he is able to master, that number is made up of *units* or *ones*, that it is simply an aggregation or accumulation of the *ones* with which he began at the outset. To illustrate the fact let him take *one* of the 5-inch sticks while you write the word *one*, and then the figure 1 on the blackboard. The 5-inch stick is suggested because it is less liable to be lost than the shorter ones, and is more easily held in place in large bundles of sticks. Then let him take another stick, and, while he holds both you can write the word two and the figure 2 as soon as he tells you how many he holds. Proceed in this way until he has 10 sticks in his hand, then put an elastic round these sticks and impress on him the fact that he now has *one ten*. He will readily see that he has *one bundle*, and that bundle is ten sticks; hence he has *one ten* or *10*.

This *one bundle* needs more room than did the *one stick*, and to represent it you write the figure 1 on the blackboard with a 0 at the right. It is *one*

bundle and *nothing* more. Now let him lay *one stick* at the right side of that *bundle* and he has 1 bundle and 1 stick or 11, when written on the board. Let him make up two bundles and then three and four, to 10 bundles. Now he has no room for representing those and must find another place. Put two elastics round the ten bundles, thus holding them firmly in *one package*. His *bundles* now have *disappeared*, and you put a 0 in the place heretofore representing them; his single sticks had disappeared before and a 0 stood in their place. The absence of his *sticks* and his *bundles* is represented by 00, standing side by side. Intuition by this time teaches him to represent his *package* by a figure 1 at their left. Let him now make up 10 *packages*, placing the proper figure in the place where stood the representative of one package as he completed each of his ten, and he will discover the law of writing *all numbers*, however large.

These 10 packages bound in one will give him the ability to *comprehend* a thousand as well as to write a thousand. Having *counted* them he finds just what a multitude 1000 is. This plan properly carried out robs the science of numbers of that terrible mystery and uncertainty which clings for years to the mind that enters the study without a proper comprehension of the simple number one. With a little practice of the kind indicated the pupil will learn to represent 564, for instance, by five bunches of 100, six of 10 and four single sticks. Next let him place sticks representing the first number under it and add the ones, tens and hundreds, putting down the several sums where they belong, thereby laying the foundation for addition and subtraction of written numbers.

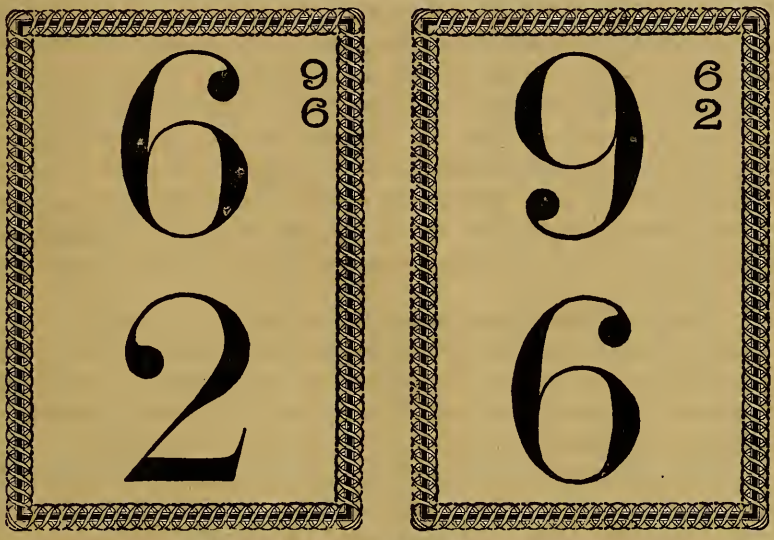
PARISH'S PRIMARY NUMBER TABLETS.

These tablets are made of wood three-eighths of an inch thick, for durability, in two sizes, one being four inches by two and the other five inches by two and a half. They are also printed on substantial cardboard. The smaller set is intended as a part of number work in the first half-year of school life and the box contains ten tablets. The large set consists of twelve tablets and is for use during the second half-year. Different combinations of blue and red dots appear on the tablets, a few of which are shown in the diagram.

The tablets are for review purposes and to establish a clear idea of numbers and their relations in the minds of children in the lowest grades. Before using them the pupils are supposed to have discovered the number facts indicated on them, and the exercises should aim at training the perceptive faculties to be quick, accurate and comprehensive. The use of the tablets is a gain over the ordinary method of review by oral questions, because the number on the tablet appeals to the sight instead of hearing and leaves a more vivid impression on the mind, which is intensified by frequent repetitions.

By this system of teaching pupils learn the analysis into equal parts of all numbers as high as twelve, and into any two unequal parts of all numbers as high as six, during the first half-year. The work is continued through the second half-year on the same principle, as far as twenty-seven, the limit of the fifth kindergarten gift. In this way the two unequal parts of all numbers as far as ten are learned, by the blocks, inch-cubes and other objects, and the whole subject is reviewed and fastened in the mind by the tablets.

Du Shane's Figure Cards.



The obverse and reverse sides of one card.

Any school-room divice which helps secure rapid and correct results in mental number work is welcomed both by teachers and the public. Thousands of people who were not properly drilled in this respect during childhood add with difficulty all their lives, and difficult adding is very liable to be incorrect. This remark is measurably true of subtraction, multiplication and division. To avoid such troubles it is necessary to teach children to read simple combinations at sight. Du Shane's Figure Cards, for primary school practice, have been prepared by an experienced teacher and published at the solicitation of other educators who have seen their value in practical use.

The set comprises thirty cards, about two and a half by three and a half inches, twenty-seven of which are printed on each side, with a different combination of digits as shown above, somewhat reduced in size. The other three cards contain common arithmetical signs.

The use of the set is very simple. The teacher takes a card at random, and, quickly holding it before the class, asks for names of figures, their sum, difference, product or quotient, meanwhile working the same prob-

lems herself by means of the small index figures in the right-hand corner, on the side next to her, which are duplicates of the large figures on the opposite side of the card. The exercise may be very entertaining and instructive to little ones, if carried on rapidly and with spirit.

The Number Builder.

The success attending the use of The Word Builder in language work suggested The Number Builder, which is a box containing a liberal supply of the first ten numerals, the cipher and the signs of Addition, Subtraction, Multiplication, Division and Equality, printed on substantial and good-sized tablets. It is intended for use as seat work by the pupils after they are thoroughly versed in the operations already mentioned. They can form tables with the contents of the box and copy them on paper or on their slates. Let the children understand that the tablets are given them for work and not play and that everything must be done accurately. If the teacher shows the right spirit and is fully in sympathy with this work the combinations which are possible and most desirable with such an outfit will readily suggest themselves to her, and after the children have worked by dictation for a time they can be trusted to make combinations of their own.

Reed's Card-board Objects For Teaching Number.

Many teachers claim that there can be but one logical method in teaching the elements of numbers, by whatever name it is known. This method consists in presenting to the learner groups of objects by means of which he may abstract the general notion which we call number.

In teaching elementary number a variety of objects is indispensable, since a general notion of any kind can only be obtained by observing many particulars. Objects of every kind convenient for school use may be employed, but it is obvious that the more interest excited in a subject by the device chosen, the less number of repetitions are necessary to fix the facts presented. Objects therefore which appeal most strongly to the learner are of the most value.

Card-board objects excite a lively interest in the subject, since they come nearer to the *real* things than any other class of objects. For whatever purpose the child needs objects in studying number, whether to determine what the number is, or to suggest and illustrate a number problem, these card-board, designs hold the thought to the work more intensely than other objects are able to do. They also give opportunity for a variety of number perceptions, since they may include horses, mice, chickens, pigs, fans, tops, brooms, dust-pans, parasols, caps, lamps or almost anything familiar to the children.

A teacher needs a set for each pupil in the class, every set consisting of ten objects of a kind. It is convenient to have each set in an envelope or box by itself to aid in quick distribution. A child having received his envelope of objects, takes from it the number he is studying,

and then proceeds to group it in a way to illustrate the number problem under consideration. If, for instance, he wishes to demonstrate that four and two are six, he arranges his horses or caps so as to correspond to this grouping, and then conforms his number problems to the picture before him.

As shown in the illustration, this assortment of card-board objects, devised by Miss E. M. Read, principal of the Springfield (Mass) Training School For Teachers, comprises thirty different sheets, each of which contains ten objects of the same kind. These sheets are sold by the dozen, and should always be ordered by the numbers given in the above cut. If, for example, a sheet of ten lamps is wanted, the number 14 must be given in the order. Considering the difficulty which many progressive primary teachers have experienced in securing enough objects of the right kind for their number teaching, it is believed that this collection will meet with a prompt and wide-spread appreciation from the profession.

CHAPTER XIII.

TIME AND MONEY.

This chapter, which is a continuation of number work, relates to the methods of teaching children how to tell the time of day and the use of money. The teacher of any experience in an ungraded school fully realizes that during the first two years of school life many things are more important for the children than reading and spelling. A little experimenting will convince her that among the practical things which seem so simple nothing is really more difficult for a child than reading the clock dial —telling the time of day. The child cannot be allowed to touch the clock, neither can the teacher or parent move the hands for his benefit, hence the difficulty.

To overcome this stumbling-block it is possible to place in the hands of both teacher and pupils a set of clock dials with movable hands, at moderate cost, for use during a series of object lessons.

The Educational Clock Dials.

These dials are made in two sizes, one for the teacher and the other for the children. The dial intended for the teacher consists of a clock face, mounted on a suitable support, with regular clock hands, which can be moved independently of each other. The face or circle is about 12 inches in diameter and the mount 14 inches square, so that the dial can be distinctly seen from any part of a large school-room, either in the hands of the teacher or as it hangs on the wall.

On the back of these dials is printed a series of illustrations and descriptions of the prominent methods of marking time used in different ages. The earliest division of time was made by simple observations of the sun, as "Sun Rise," "Noon" and "Sun Set," Noon being later determined by a "Noon Mark," which was the original of the Dial. The Graduated Candle, Hour Glass and Water Clock were in turn supplemented by "Grandfather's Clock" and the celebrated American watches, until now a wide section of the country can be provided by electricity with absolutely correct time from an astronomical observatory. The illustrations of these different appliances on the back of the large dials will serve as a text for various instructive talks by the teacher.

The child's clock dial has a face four and a half inches in diameter, on thick card-board, with movable steel hands, being in every respect as complete for the purpose for which it is intended as the large dial. The use of these dials makes the teaching of time very simple. The little child can move the hands of his dial at will and thus "learn by doing." He is always more interested in doing a thing than in merely watching somebody else do it, and he receives instruction in direct proportion to his interest in the matter under consideration. Consequently it is evident that much more may be accomplished by putting a small dial in the hands of each pupil in the class or school, so that all may solve the simple problems proposed silently and in concert, than to depend on the single dial which the teacher uses.

A Lesson On Time.

In order to use these dials the teacher must secure for the school-room a stricking clock, between which and the dials it will be necessary for the children to "compare notes." After they have been taught to name the face and hands of the clock and drilled in the first twelve Roman letters, either from the clock or dial, we should suppose the first time-lesson to begin somewhat in this way:—

Teacher.—(Holding up a dial) What is this like?

Children.—It is like the face of a clock.

Teacher.—It is a clock dial, but we can play it is a real clock, (pointing to the hands.) What are these?

Children.—They are hands.

Teacher.—Are the hands alike?

Children.—One is long, the other is short.

Teacher.—What shall we call them?

Children.—Long hand and short hand.

Teacher.—(Give each child a dial) Hold the dial so that XII is at the top. Make the short hand point to VI and the long hand to XII. When the hands are like this, it is six o'clock. Turn the short hand to IX. What time is it now?

Children.—Now it is nine o'clock.

Remind the children that this is the time when school begins. Then let them find the different hours for closing school, recess, breakfast, dinner, supper, getting up, going to bed, going off on the train or the street car, going to church, etc. The lessons should be continued by showing the movement of the hands from hour to hour.

Teacher.—Notice the clock. Can you see whether both hands move alike?

Children.—The long hand moves faster than the short hand.

Teacher.—Yes, much faster. It goes around the circle while the short hand goes from I to II, and so on.

Tell the children that it takes an hour, or 60 minutes, for the long hand

to go round the circle and for the short hand to go from I to II, etc. Give them practice in moving both hands on the dials, first moving the long hand a quarter of an hour and then the short hand a distance estimated by them to be one-fourth of that between two of the twelve divisions on the dial. Then move the long pointer through the second quarter and the short pointer the same distance as before, so continuing to do until both have been moved over the same distances that the pointers of a real clock would have passed during an hour.

Before going farther much practice should be given in telling the half and quarter hours. As an aid in this work some teachers favor dividing the dial into halves and quarters, which can be readily done by tying strings tightly across the face, vertically and horizontally. Sometimes it is a good plan to have a child detailed to remind the school when the quarter hours come round, or to have the different lessons to begin and end on the halt and quarter hours.

As soon as the children can tell time by the clock and readily set their dials to the teacher's dictation see that they can count by fives from five to thirty and teach the minutes by fives, 5, 10, 15 etc., past the hour, and then count by fives toward the next hour. By this time it is proper to let the hands be called *hour* and *minute* hands. In all these exercises the teacher should be careful not to hurry over ground which requires weeks and months of patient drill.

Of course much more can be taught the children in regard to time than is here indicated—the divisions of days, weeks, months and years and the reasons for these divisions—but such teaching would necessarily form another series of lessons, leading into geography and astronomy, and would have to be treated in a different way, although pains should always be taken to show the underlying connection between the second series and the first. Some teachers also find the clock dials useful in illustrating the principles of fractions.

The Educational Toy Money.

It is a trite saying that "Time is Money," but the study of both can be closely connected with advantage in the ungraded school.

All children who have any idea whatever of numbers like to count money, and a newsboy or gingerbread peddler who is practiced in the art, although he be only "knee high," often shows himself more reliable at making change than the average college graduate. Moreover, when such curbstone merchants turn their attention to arithmetic in school they are found to have already mastered its fundamental processes.

Learned treatises on political economy tell us that money is "a measure of value and a medium of exchange," and this is precisely what the child needs in his primary calculations, something to measure the value of the things with which his mind is dealing and also something to educate the propensity which is constantly leading him to "trade" with his fellows, so

that it shall become more than a mere pastime, a part of his equipment for life. These ideas are by no means wholly theoretical, because not a few teachers testify that whenever our Educational Toy Money is used in primary schools the pupils acquire a facility of correctness in adding, subtracting and multiplying which commends it as the best appliance yet found for acquiring an early knowledge of the fundamental processes of arithmetic.

This toy money is made of heavy card-board and represents the different coins in current use, from the $20. gold piece down to the cent, the

facsimile being in each case as perfect as in this illustration. The collection includes double eagles, eagles, half-eagles, quarter-eagles, $3.00 pieces, dollars, half-dollars, quarters, dimes, half-dimes, two-cent and cent pieces, in such proportion as to make about $100 in United States money, placed in a box containing eight movable trays for the different denominations.

An Outfit For "Buying and Selling."

Few mortals enjoy the posession of money without the means of spending it. The most diverting and often the most instructive "busy work" for little people, both at home and in school, is that which has about it a strong flavor of real life, which is much like what "grown up" folks do as it can possibly be. Consequently the outfit for "Buying and Selling," published in connection with the toy money, is likely to prove a delightful boon to those juveniles who want to keep store, and where can we find children who never experience violent attacks of that fever?

Buying and Selling is in every sense an educational game. The box contains toy money representing about $100 and thirty-six pictures of common-place commodities, such as a dozen eggs, a cord of wood, pound of coffee, ton of coal, etc., which are intended to be bought and sold as substitutes for the articles which they represent. The box also includes slips of manilla paper for making paper bags to hold bran or sawdust and be duly labeled as representing a variety of goods, unless the youthful merchants are allowed to fill them with the "real" things. Four sheets of

printed labels are provided, to be cut up so that the name of each article shall be on a separate slip, and the collection is rounded out by adding a form on which to make the paper bags and careful directions as to how it should be done, together with a printed list of the prices which it is proper to put on the goods, in case the local price of any article is not known.

Business In The School-room

A bright teacher will not need to be told how to use this game to advantage in the school-room, but will hit on the ways that suit her best. In writing to the School Journal on this subject such a teacher says:—

"The school was divided into "producers" of various kinds: Farmers, manufacturers, etc. Each chose his occupation and constructed a sign 8x4 inches, with his name and occupation neatly lettered on it; these signs were hung on a line in the rear of the room:—

PETER JONES. Hay for Sale.	JOHN SMITH. Potatoes for Sale.	WM. JOHNSON. Cotton Cloth.

Then one pupil was appointed as a retail merchant and one as a wholesale merchant. The latter was the capitalist, and to him I gave the money on his depositing his note with me.

Now the "producers" sold hay, oats, corn, cloth, etc., to the "wholesaler" and got money and put in their boxes. Then the "retailer" went to the "wholesaler" and bought goods and arranged them in his store, which was a neat set of pigeon-holes properly labeled; over it was his name. This was also the plan of the "wholesaler."

Now the "producers" went to the retailer and bought things for "consumption;" they paid money for them.

A certain hour was fixed each day for trading, laying in supplies, etc., a certain time for consumption, etc. Each "producer" was obliged to make out a bill to the "wholesaler;" the "wholesaler" to the "retailer," and he to the "consumer." All of these were submitted to one pupil who was called the "accountant." If any mistake was detected the maker of it was fined in *real* money (one cent usually) and this went into a "fund" that was expended, when it reached 25 cents, in oranges, apples and candy for the benefit of all the class. This was a time of much fun.

The eighth grade (pupils eight years old) had very simple exercises, no fractions. The ninth grade had some that were harder, and so on. The "retailer" regulated the difficulties; he would sell out, for example, 540 lbs. of hay at $15 per ton, or 4¾ lbs. of codfish at 5 cents a lb. etc., to the advanced classes.

Every pupil was required to "balance his cash" every night. About forty articles were dealt in: Boots, shoes, clothing, hams, potatoes, sugar, etc. The "wholesaler" and "retailer" kept books; the others paid cash, had bills made and receipts given. All papers were filed away in envelopes.

It need not be said that the deepest interest prevailed; and much competition was demanded and obtained.

1. Let the teacher select a good pupil to be *retail* merchant.

2. Another good one to be *wholesale* merchant. If possible have a desk for each in opposite corners of the room.

3. Give $1,000 to the wholesale merchant—he gives his note.

4. Now let the "producers," the other pupils, come up and sell to the wholesaler. He takes in their envelopes with hay, cloth, etc., and counts them. They make out bills; he pays, and they give receipts.

5. Let the retailer go and lay in his supplies.

6. Now let these producers (as heads of families) go and buy—some one thing, some another, and take the goods along, paying cash. Bills will be made out, etc. For small boys the price of goods must not be in fractions; let the teacher guide this with care. Let each boy keep every paper so as to *account for all his money.* For example, a boy as producer gets $10. What has become of it? He must show a voucher for the expenditure."

Any scheme like this can easily be carried into the higher grades by organizing banks, railroad, steam-boat, express and telegraph companies, etc. In such cases the transactions will be almost wholly carried on by accounts and checks on banks, deposits being made in checks and drafts, so that only a small amount of money is required. Additional enthusiasum can be secured by forming partnership firms, each containing two or more pupils, for conducting different lines of business. By taking some pains almost every teacher can get together a collection of blank checks, drafts, notes, bill-heads, bills of lading, freight and express receipts, telegraph blanks, etc., the pupils in many places being able to help increase the list. A great deal can be learned in properly filling out these blanks, writing condensed telegraphic dispatches at the rate of ten words for 25 cents, and undertaking many other transactions of a similar nature.

Referring once more to the "Buying and Selling" outfit it will be seen that the folding and pasting of the paper to make the bags, under the teacher's supervision, and the careful filling and labeling them is an exercise in primary manual training which is by no means to be despised. While the child is handling any commodity or its representative let him learn where it comes from, that cork, for instance, is brought from Spain and rubber secured in Brazil, with other interesting facts.

A reference to the chapter on Weights and Measures may suggest to the teacher additional methods which will be valuable.

How To Teach Interest.

Before leaving the subject of toy money it may be helpful to append a lesson regarding interest by W. M. Griffin of the Cook County Normal School, published in the Teachers' World, which runs in this wise:—

"Nothing was said to the pupils about interest. They were simply told

to bring their toy money to school the next day, when I began the lesson as follows: I lent a man $1 for one year and he agrees to pay me 6 cents for the use of it. Take from your money the amount he pays me for the use of the money.—Henry, how much have you taken? Henry answered, "six cents." How many agree? Right. Next, you may take the amount he owed me at the end of the year. Jennie, how much have you taken? "$1.06" said Jennie. How many agree? Right again. How much would he have paid me for the use of $2, $8, $10, $20, $100? The answers are drawn from their toy money each time. How long did the man have my money, John? "One year." How many months was that, William? "Twelve months." If he had taken one dollar for two months what part of twelve months would that have been, Frank? "2-12 or 1-6 of twelve months." What did he pay me for the use of it for twelve months, Minnie? "Six cents." Then what would he have paid had he kept it but two months, Mary? "1-6 of 6 cents, or 1 cent." Now draw from your money what he should pay for $2 for two months. They all drew 2 cents.

Next the pupils were told to draw the answer to the amount named and to arrange the amounts drawn in a line on the desks, the time being two months, as follows:—

Amount Named.	Amount Drawn.
$1.00	$0.01
$2.00	$0.02
$8.00	$0.08
$10.00	$0.10
$80.00	$0.80
$480.00	$4.80

The answers were then read by different members of the class; they referring to the different sums they had drawn in order. Who can tell what you have discerned? John answered, "I take as many cents each time as you name dollars." Good! How many noticed that? Hands all up but two. We go over the work again and show no signs of impatience, and now all see the truth.

Again, what will I receive for $8 for two months, Nellie? "8 cents." Then how much will I receive for one month. Who can tell? All hands raised. Frank may tell. "1-2 of 8 cents, or 4 cents." You may again draw answers as I name the amount lent, remembering that the time is one month.

Amount Named.	Amount Drawn.
$2.00	$0.01
$8.00	$0.04
$10.00	$0.05
$20.00	$0.10
$620.00	$3.10

Next, you may draw two answers. (1). What I get for one month. (2). What I get for the number of months I shall name at differen times. Ready?—

Amount Named.	Amount Drawn.	Time in months.	2d Ans.
$8	$0.04	5	$0.20
$20	$0.10	8	$0.80
$60	$0.30	2	$0.60
$40	$0.20	10	$2.00
$840	$4.20	10	$42.00
$480	$2 40	5	$12.00

The answers were read by the different pupils, when the following questions were asked: What do we call money paid for the use of a house? Who can tell? John tell. John said, "the money paid for the use of a house is called rent." Right. What do we call the money paid to clerks? The answer, salary, was given. What do we call money paid for the use of money? Only five of you know. Very well, then, I shall wait and ask you again to-morrow. The next day nearly all were ready to tell me, "The money paid for the use of money is called interest."

A Few Hints About Percentage.

Kittie Kearney, writing from Wisconsin to Popular Educator, says that in teaching percentage she first impresses on the children the fact that it means *part*. The way for this portion of the work has been carefully prepared, by constant and thorough drill in the relation of numbers; *i. e.*, what *part* one is of another. "As soon as they understand the significance of percentage I proceed to tell them that per cent means by the 'hundred,' and that the whole of anything is represented by one hundred per cent. This latter fact they will generally know from the markings on the previous examination papers or slate work. Next present the dollar with its various parts, such as the half, quarter, etc., and by a little judicious questioning the relatitions of parts are easily developed. Perhaps the pupils knew all this before reaching percentage but had not been called on to think or tell about it. Now you will find they are ready and anxious to tell.

Thus: Julia, what part of a dollar is fifty cents?

Julia.—One-half.

Teacher.—Then what per cent is it?

Julia.—It is one-half of one hundred per cent, or fifty per cent.

Edward, what part of one dollar is twenty cents?

Edward.—One-fifth.

Teacher.—Then what per cent is it?

Edward.—It is one-fifth of one hundred per cent, or twenty per cent.

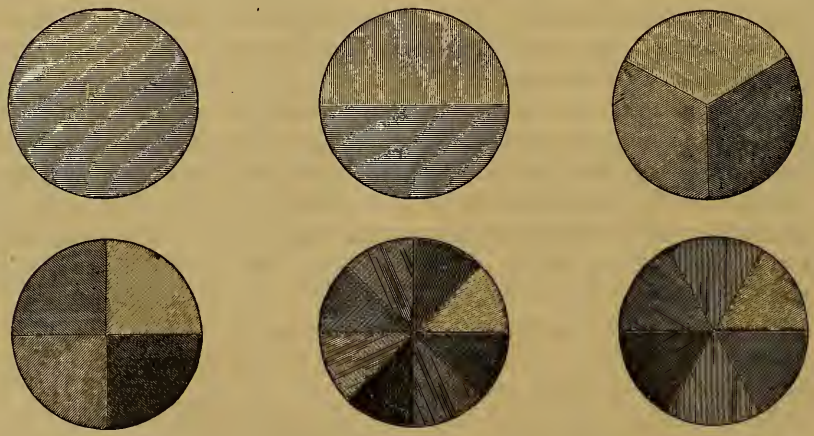
After using the allquot parts of a dollar, I take crayons or any objects that will readily admit of a division, and distribute a certain number of them, say ten, among certain pupils, requesting individuals to give others a required per cent of their amount.

CHAPTER XIV.

THE TEACHING OF FRACTIONS.

The use of objects in teaching fractions has long been considered necessary by the best instructors, who have frequently resorted to apples, pears and other fruits for this purpose, because they are conveniently handled, and subdivided. But the difficulty of reconstructing the several wholes and keeping the parts in place is annoying, not to mention the consumption of time and fruit. Wooden models of the apple and pear have been made in sections, with provision for holding the parts in place, but these are expensive. Discs of wood and card have also been used by the teacher in explaining problems to the pupils. Within a few years, in accordance with the principle that only the work of any school-room which every member of the class does for himself can be regarded as the best, a set of fraction cards has been devised for use on each pupil's desk, with a large set for the teacher.

THE COLORED FRACTION DISCS.



These cards are discs of heavy card-board, four inches in diameter, cut in halves, thirds, fourths, sixths and eighths, with one whole disc, making twenty-four pieces, put up in a serviceable envelope, with instructions to teachers. Colors are introduced to give variety and to distinguish between the several pieces, the selection being such that all the elementary combinations of harmony and contrast can be fully illustrated.

In some educational devices, language cards for instance, colors have been used to designate things different in character, red for verbs, yellow

for nouns, etc. When this plan is followed, however, there is danger that the little child may possibly conceive the notion that the color employed has some special relation to the thing which it is used to represent; in fractions, for example, that if a section indicating one-half is red the half of every object must necessary be that same color. This objectionable result is here avoided by the arrangement of the colors. In the sixths, the complete disc consists of red, blue, green, yellow, orange and purple pieces, which may be arranged to show contrast and illustrate combinations of the primary colors, thus supplying a good set of color-cards without additional expense and rendering the fraction cards more attractive and effective. As with all aids furnished to each pupil, the work here must be by dictation and not by imitation, consequently there is no necessity for discs in the hands of a teacher, if she can use the blackboard with facility.

Some teachers prefer as an aid in beginning their lessons in fractions a set of six large uncut discs, seven and a half inches in diameter, put up in a substantial envelope, representing the six smaller discs when put together, and used to explain which are halves, which are quarters, etc. One in one color represents the unit, another is divided into halves by two contrasting colors, and so on through the subdivisions illustrated by the cut discs.

These larger uncut discs can be held up before the class without inconvenience or special appliances to distract the thoughts of the teacher, and the first idea of fractions may thus be taught.

The unit is first shown and, if desirable, is called a pie or cake. Then the disc divided into halves is exhibited and the halves explained, and other denominations in succession.

From these discs colored in sections, which are conveniently handled by the teacher, the children obtain a knowledge of the relative sizes and forms of the different divisions before the cut-up discs are given to them.

They are thus able to readily select a half, a quarter, or an eighth at sight, and therefore can begin simple operations with the small discs purely by dictation.

Should any teacher prefer to use the large discs cut up it is a simple matter to cut them on the lines with heavy shears, and they may be shown to the class fairly well by spreading a black woolen shawl over an atlas steeply inclined toward the pupils.

An Illustrative Lesson.

Suggestions as to problems and methods of work are hardly necessary, as every teacher will have her individual preferences, and should have the ability to get best results from her own details in method, and yet the following lesson may have some value as merely suggesting the wide field opened by the use of the individual discs in the hands of the pupils.

The envelopes containing discs having been distributed, the teacher asks each pupil to hold up a whole circle.

Teacher.—What have you now?

Child.—I have a circle.

Teacher.—Make a circle out of two parts on your desk—Compare these parts.

Child.—They are equal or alike.

Teacher.—(Showing a circle of paper cut into two unequal parts.) Compare these parts.*

Child.—These are not alike.

Teacher.—When we divide the circle into two parts, just alike, what do we call the parts?

Child.—We call them halves.

Teacher.—How many halves are there in a circle?

Child.—There are two-halves in a circle.

Teacher.—Put the one-half and one-half together, how many halves have you?

Child.—I have two-halves.

Teacher.—How many circles have you?

Child.—I have one circle.

Teacher.—What makes two halves?

Child.—One-half and one-half make two-halves.

Teacher.—What makes one circle?

Child.—One-half and one-half make one circle.

Teacher.—Take one-half circle from two-halves, what have you left?

Child.—I have one-half circle.

Teacher.—One-have from two-halves leaves how many?

Child.—One-half from two-halves leaves one-half.

Teacher.—One-half from one-half leaves how many?

Child.—One-half from one-half leaves nothing.

Teacher.—One-half from one, leaves how many?

Child.—One-half from one, leaves one-half.

Teacher.—How many are two one-halves?

Child.—Two one-halves are two-halves, or one.

Teacher.—How many one-halves in two-halves?

Child.—There are two one-halves in two-halves.

The tables on the following page are simply suggestive of the many combinations the children can make with easy fractional numbers. While doing this they are becoming familiar with the principles that govern all our work in fractions, the most important of which is that they look on the fractional unit as on any other unit, and on the names, fourths, fifths, sixths, etc., as equivalent to books, boxes, apples, etc.

If these things are kept in mind the children will perform all the processes in fractions as readily as in whole numbers.

*Note.—A piece of 4-inch circular folding paper will answer the purpose.

TABLES.

$\frac{1}{2} + \frac{1}{2} =$	$1 \div \frac{1}{2} =$	$1 \div \frac{1}{4} =$
$\frac{1}{2} - \frac{1}{2} =$	$\frac{1}{2} \div 1 =$	$\frac{1}{4} \div 1 =$
$\frac{1}{2} \times 1 =$	$2 \div \frac{2}{2} =$	$4 \div \frac{4}{4} =$
$1 \times \frac{1}{2} =$	$\frac{2}{2} \div 2 =$	$\frac{4}{4} \div 4 =$
$2 \times \frac{1}{2} =$	$2 \div \frac{1}{2} =$	$1 \div 2 =$
$\frac{1}{2} \times 2 =$	$\frac{1}{2} \div 2 =$	$1 \div 4 =$
$\frac{1}{4} + \frac{1}{4} =$	$1 \times \frac{1}{4} =$	$\frac{2}{4} - \frac{1}{4} =$
$\frac{1}{4} - \frac{1}{4} =$	$\frac{1}{4} \times 1 =$	$\frac{4}{4} - \frac{2}{4} =$
$\frac{1}{4} + \frac{2}{4} =$	$2 \times \frac{1}{4} =$	$\frac{3}{4} - \frac{1}{4} =$
$\frac{2}{4} + \frac{2}{4} =$	$\frac{1}{4} \times 2 =$	$\frac{4}{4} - \frac{3}{4} =$
$\frac{1}{4} + \frac{3}{4} =$	$0 \times \frac{1}{4} =$	$\frac{2}{2} - \frac{1}{2} =$
$\frac{2}{4} + \frac{1}{4} =$	$\frac{1}{4} \times 3 =$	$\frac{4}{4} - \frac{1}{4} =$
$2 \times \frac{1}{4} =$	$3 \times \frac{1}{4} =$	$1 - \frac{1}{2} =$
$\frac{1}{4} \times 2 =$	$4 \times \frac{1}{4} =$	$1 - \frac{1}{4} =$

CHAPTER XV.

WEIGHTS, MEASURES AND MENSURATION.

"If you wish to teach a boy linear and surface measures, furnish him lumber and tools and set him to work to make something. He will acquire more knowledge of these measures by one day's work than by repeating tables and solving problems for six months. When he has formed habits of observing and thinking the study of books may supplement the knowledge gained from the study of things, but to reverse this order is to place the abstract before the concrete, the unknown before the known. Pupils cannot think before they have observed. Regard yourselves as the directors and stimulators of your pupils' powers, and your task is not a discouraging one."

These vigorous remarks, clipped from an educational journal, have the right ring about them, although the "lumber and tools" may not be practicable in every case.

Few children or even adults have any very definite idea of a pint, a gallon, a peck, a yard, a pound, etc., and yet nothing is of more practical value in connection with school-problems than this knowledge. That which a child uses and handles he becomes interested in and thoroughly familiar with. If he measures the school-room with a foot-rule, or yard-stick or a tape-line, or with a pint measure he fills a gallon or a quart measure, or with the scales he weighs real things, all these quantities are much more clearly fixed in the mind and their relation to each other better remembered than when a much longer time is spent in dreary, uninteresting pouring over tables which convey to him very little knowledge.

The experience of a Pennsylvania teacher may add some light on this subject, for the benefit of teachers in the ungraded schools. She writes in the National Educator as follows :—

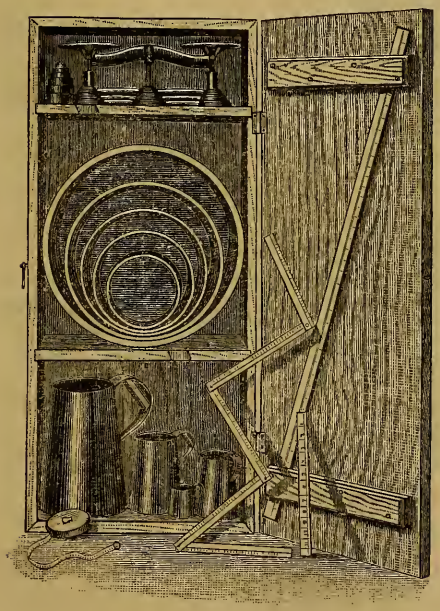
"I am teaching the First Primary Department, nevertheless my pupils are learning the tables and can use them creditably. In teaching liquid measure, I have the gill, pint, quart and gallon measures placed on my table. I am next provided with a bucket of water. The children learn the name of each measure and what is sometimes measured in each. I then ask a pupil to come forward and fill the gill with water and pour it into the pint measure. I have him repeat this until the pint measure is full. The pupils at once see that four gills make a pint. The quart measure is then filled from the pint and they learn that two pints make a quart. The gallon is next filled from the quart measure, and they tell me that four quarts make one gallon."

"I have balances and weights, ranging from one-half ounce to two pounds, with which to work. My pupils have examined all the weights. They discovered for themselves that some are larger and heavier than others. They express their opinion about the size and weight. They find numbers marked on them and I tell them that the 1 on the large weight is for one pound, and the 1 on the very small one is for one ounce. I tell them that if we had sixteen of the one-ounce weights and should place them on one side of the balances and the pound weight on the other, we should find they were equal in weight. From this comparison they have found that sixteen ounces make a pound. In the same way each weight is examined and the denomination of the same determined. In teaching long measure the foot-rule and yard-stick are used."

After the essential facts pertaining to the different sets of weights and measures have been learned it is an easy matter to sum them up by writing a table on the board, like the following:—

12 inches make	1 foot.	36 inches make	1 yard.
27 inches "	$\frac{3}{4}$ yard.	18 inches "	$\frac{1}{2}$ yard.
9 inches "	$\frac{1}{4}$ yard.	3 feet "	1 yard.

THE CABINET OF WEIGHTS AND MEASURES.



Methods of teaching like the above cause a general demand for a collection of sample measures of bulk, length and weight, for all grades of the public schools. This illustration shows a cabinet containing all the necessary standards, conveniently arranged for exhibition or use. The chestnut case is well-finished and varnished, being provided with two shelves and a door that is strongly hinged and has a hook, and also a lock and key. This chest can be screwed against the wall of the schoolroom or placed on a shelf.

It will be found an exceedingly valuable help in "playing store," or in making the intelligent study of weights and measures both possible and a pastime for young children. No teacher can fully appreciate the delight of an ungraded school, particularly if it be in the country where modern "helps" in teaching have not been numerously represented, on the first day that such a collection

is made available and the children have the opportunity to begin business as weighers and measurers, until she has shared it.

The contents of the cabinet is as follows :—

1—A set of Fairbanks balance scales.

2—A set of weights from 1 lb. down to ½ oz.

3—A set of standard oak measures, well-finished, sealed, and varnished, 1 quart, 2 quarts, 4 quarts, 8 quarts and 16 quarts.

4—A set of tin liquid measures, four pieces, 1 gill, 1 pint, 1 quart, 1 gallon. These are made without lips or flanges, to better convey a correct impression of actual size, and are neatly japanned.

5—A fifty-ft. tape measure in brass-bound, durable case.

6—A good hard-wood yard-stick accurately graduated to inches and eighths on one side, and on the other to fractions of a yard.

7—A foot-rule containing inches graduated to the following fractions :— Fifths, tenths, twentieths, fortieths, sixths, twelfths, twenty-fourths, forty-eighths, eighths, sixteenths, thirty-seconds, and sixty-fourths.

8—A folding meter, showing decimeters, centimeters and millimeters.

9—A large protractor-scale, 16 inches long, for measuring angles and for laying them out on the blackboard.

The style and quality of all this material is of a high grade, suitable in appearance and accuracy for the use intended.

While all the standards absolutely necessary in a common school are found in the above list the following are exceedingly valuable for a complete demonstration of the metric system, and may be conveniently added, as there is room for them in the cabinet :—

10—A cubical liter measure, made very accurately, of heavy stock and well japanned to match the other liquid measures, and a balance-weight accompanying it for the purpose described below.

11—A set of metric weights, from 1 kilogram to 10 grams.

A liter of water, which is a cubic decimeter, weighs a kilogram, and in order to demonstrate this a small weight is furnished with each liter measure, which will exactly balance it on the scales.

For an experiment, place the liter measure on one plate of the balance, and on the other plate put the small lead weight, and they will exactly balance each other. Add the kilogram weight and then pour water into the measure, and when full it will just balance the weights, showing that the cubic decimeter or liter of water weighs just one kilogram.

A Manual Demonstration of Mensuration.

Number work in the ungraded school will naturally reach beyond mere primary methods into the broader field which mathematics opens to all who follow that science through its different stages. The apparatus shown in the cuts on the next page for illustrating the different problems of mensuration is the invention of L. W. Parish and is highly praised by those teachers who have put it to practical use. One exhibition of these simple man-

ual demonstrations to a pupil who is studying mensuration, even before the mathematical demonstration is attempted, will impress the facts more firmly on the mind than weeks of drilling on formulas.

Fig. 1.

Fig. 2.

In the apparatus shown in figures 1 and 2 we have the manual demonstration that the area of a circle is equal to the radius, multiplied by one-half the circumference. It consists of a large number of wooden sectors, attached at their bases to a couple of pliable bands of brass which can be jointed together so as to make a circle with a diameter of eight inches, as represented in figure 1. If these two semi-circumferences are straightened out two comb-like forms are secured, and by inserting the teeth of one set between the teeth of the other set and closing the two together the rectangle shown in figure 2 is obtained. The base of this rectangle is the semi-circumference of the circle straightened out, and its height is the radius of the circle.

Fig. 3.

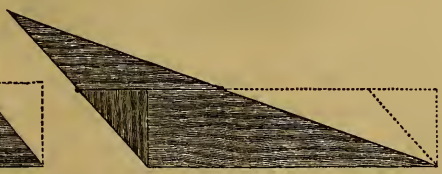


Fig. 4,

AREAS OF TRIANGLES.

Figures 3 and 4 demonstrate mechanically that the area of a triangle is equal to its base, multiplied by one-half its altitude. Figure 3 illustrates the problems when a perpendicular from the apex falls within the base and figure 4 when it falls outside the base. The former is more simple and later more effective.

Both triangles are formed of polished wood and are divided in such a way that by simply swinging certain parts on their brass hinges they become rectangles, twelve inches long and three inches high. When the triangles and the sectors which form the circle are ordered at the same time they will be packed together in a neat box.

CONTENTS OF CONE, SPHERE AND CYLINDER.

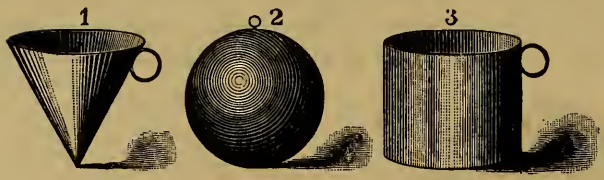
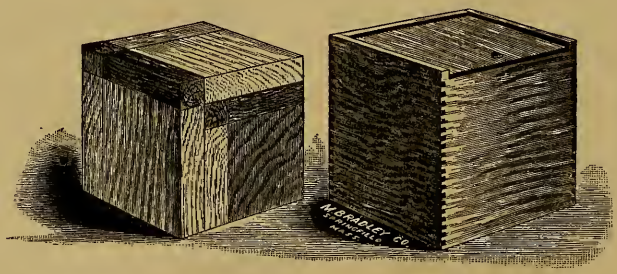


FIG. 5. FIG. 6. FIG. 7.

These three pieces demonstrate the relation between the contents of a cone, sphere and cylinder. Figure 5 is a conical cup, three inches in diameter at the top, and three inches deep. Figure 6 is a solid sphere. Figure 7 is a cylindrical cup, three inches in diameter and three inches deep.

Actual demonstration shows that the contents of the cone three times filled with water fills the cylinder, and that if the cylinder is filled with water and the ball entirely immersed there will remain in the cylinder just water enough to fill the cone. It follows therefore that the contents of the three are as the numbers 1—2—3. The pieces are packed together in a box.

CUBE ROOT BLOCKS.



These blocks are made in two sets, the several pieces being manufactured with the same care and accuracy which is bestowed on the kindergarten blocks.

The above illustration represents the No. 2 set, carrying the operation to two places. The solid cube in this set is one and a half inches square, making the complete cube two and a half inches. In the No. 1 set the solid cube is two inches square, with the completed cube two and a half inches. The blocks are made of three kinds of wood and the box is polished cherry, with strong lock-jointed corners.

CHAPTER XVI.

GEOGRAPHY.

A good many "new-fangled" notions about the teaching of geography have found their way into the schools during the last few years, which tend to revolutionize that study in a greater degree than has been attempted by the so called new education in any other quarter. This reform is aimed directly at the dry details which have too often cumbered text-books on geography, and is in the interest of sand modeling and certain other matters on which a lack of space forbids us to dwell.

The teaching of geography is a field of endeavor into which the teacher of an ungraded school can well afford to throw all her energies, particularly if that school is located in the country. For where can we find a city child who can be made to comprehend the meaning of the natural divisions of the land and water as intelligently as the country boy who has some of them constantly before him? Geography is a study in which every pupil who is old enough to be in school at all should take an interest. Here is a sample of the kind of questions that will interest the youngest children, which we borrow from the American Teacher:—

In what town do you live?
On what street?
On which side of the street?
Which way does your front door face?
What direction do you go in coming to school?
On what street is the school-house?
In what direction from the school-house is the nearest church?
Name the principal street in your town and tell its direction?
On what street is the post-office?
In what direction is the teacher's desk from the clock?
Draw a diagram of the school-room floor.
Draw a map of the school-yard.
Name some officer in your town.
If there is any river in your town name it.
What town is north of your town? South? East? West?
Name the cities in your county.
Name the rivers you have seen, not exceeding five.
Name the mountains you have seen, not exceeding three.
Name the lakes you have seen, not exceeding three.
What is the county-seat of your county?
In what state do you live? Name its capital.

Who is the governor of your state?

Who is the president of the United States?

What city is the capital of the United States?

The trouble with very many geography recitations in the past has been that the pupils were "dragged through" endless pages from an iron-clad text-book, when the maps were poor, the language technical and the phraseology dry as dust. To avoid the repetition of such recitations the teacher must come to the rescue of the children, in a multitude of ways. At one time she can tell "a story of somebody's real experience in the country they are studying and find the book containing it for a member of the class to read. When they all discuss it curiosity is aroused, enthusiasm awakened and the sleepy boy and indifferent girl, all hero-worshippers as they are, will contribute something worthy to the general information. A new impetus is given to study when children become helpers in a recitation by telling things that they have read from real books. It is a good plan to devote one lesson a week to the contributions of the children. How they will collect pictures and specimens and find bits of valuable information about a far away country! How their imaginations will people it and bring it to their very doors! By a little judicious effort the trashy novel will give way; there will be no room for it in minds that are eager for the living facts stored for them in the Zigzags, the Bodley's, The Family Flights, Miss Brassey's Voyage in the Sunbeam and Priee's Around the World, followed by something from Knox, Stanley, Taylor, Livingston and a host of other real travelers."

The liberal use of charts will do a great deal to make the study of geography interesting. The teacher who makes her own will doubtless prize them more than any she buys or borrows, although the exchange of charts between teachers from time to time may be helpful. A convenient home-made chart can be obtained by taking several sheets of manilla paper, 12 by 18 inches or 18 by 24, and tacking them to a piece of broom-handle of suitable length, having first placed a narrow strip of thick cloth at the top of the upper sheet, through which to drive the tacks. Collect such pictures from the illustrated newspapers and all other sources within reach as will add interest to the study of whatever part of geography you have in hand at the time, and fasten them to the sheets of your chart. Attach a string to the ends of the roller, so that the chart can be hung on the wall and each sheet be turned over the roller when it has been used. Some teachers prefer to make their charts in separate sheets, binding each one with cloth and having eyelets put in at the top. In this case the sheets are hung together on hooks at the beginning of the lesson, and when a sheet is no longer needed it is transferred to another set of hooks, by the side of the rest. A little experience with the charts will quickly show any bright teacher how useful they can be made and how much the children enjoy them.

Perhaps we can do our readers no greater service than to quote a summary of "What the pupil should know in georaphy at his graduation from the grammar school," by Alexander E. Frye, published in Popular Educator, which is as follows :—

1. The general arrangement of the earth's slopes, as grouped in the great continental river basins; together with the *general* outlines of the continents.

2. The heat-belts of the earth, as determined by latitude, elevation, etc.

3. The belts of trade-winds, return trades, and principal monsoons.

4. The general distribution of rain-fall.

5. The division of the earth's surface into fertile and barren regions, as determined by soil and climate.

6. The natural floral and faunal regions, and mining districts.

7. The races which dwell upon these regions.

8. The world's centers of trade, principal capital and historical cities, about *fifty* in all; and the principal routes of trade.

9. The location of countries upon the earth's great slopes.

10. The proper use of the atlas and gazetteer; and above all, our pupils should be led to acquire a taste for good books of travel.

The Continental Series of Dissected Maps.

There are various advantages connected with the use of outline dissected maps, both for school instruction and as a home diversion, which commend them to teachers and parents. These maps have peculiar features which render them particularly valuable helps in teaching geography.

The set comprises outline maps of Europe, Asia, Africa, North America and South America, drawn to one scale. Heretofore the scale of a map has been adapted to the size of the atlas page, and many youthful students of geography have been led to suppose that Europe was nearly as large as Africa. With this series of uniform scale maps, printed in pleasing colors, mounted on wood three sixteenth of an inch thick, and cut up to the boundary lines of the continents and divisions, the child will gain a definite knowledge of the shape, location and relative size of each portion of a continent, not to be acquired by any other means.

Covering the entire back of each map is an original design, lithographed in colors and depicting the principal animal and vegetable productions of the country, which may be the means of imparting to the pupil many ideas concerning lands both near and remote which we should not gain from the text-book alone. Indeed the thoughtful teacher will find nearly or quiet as much use for the backs as the fronts, as by studying the two together the country and its productions are closely associated in the minds of the pupils. Both fronts and backs are published unmounted and in this form can be used in chart work. A separate map of the United States is also published, mounted on wood and having on the back colored lithographic designs showing the productions and industries of our country.

CHAPTER XVII.

PHYSIOLOGY.

There is a growing demand for the teaching of physiology in all our public schools, and in many states it is required by law. The importance also of teaching the necessity of temperance in securing healthy physical, mental and moral development has also, in recent years, impressed itself on teachers, parents and even legislators.

For children under twelve or fourteen years there is no need of a text-book. The teacher can give short talks on hygiene, which is the science of preserving the health, name the different parts of the body and locate them, making such outlines of their structure as shall seem proper. She will also find it a good plan to talk to the school familiarly about any violations of the laws of health which she sees are prevalent, as the wearing of wet clothing, standing in cold drafts, lying on the damp ground, unhealthy food and modes of eating and the use of narcotics, as well as the need of ventilation, a correct method of breathing, cleanliness of person and the care of the eyes, throat, skin and feet, together with many other things which will suggest themselves to the observant instructor, intent on developing her pupils in all those things which help to build up a well-rounded education.

The teacher may not be able to prepare talks so frequently as she desires, in which case she may read a few passages from some good book on physiology, and explain the same to the pupils. In this way she can fulfil the law, when the pupils have no books. In both methods the teacher should be careful to question the pupils *very frequently* on what has been told them in previous exercises. Only by so doing will they be made to remember these matters. If the older pupils have books, a good method of recitation, at least the first time going through the book, is to have the pupils read the lesson, very much as they would a reading lesson. As each pupil reads he should be questioned to see that he understands what is read. The teacher must also explain all difficult passages. Good work can be done by this method, and it is especially commended to young teachers. A writer on this subject in a school publication of recent date says: "We are not teaching physiology in school for the sake of knowing all about the body, but to know that which will contribute to health and happiness." There is sound truth in this statement which ought never to be overlooked. It is also well to remember the "don'ts" while teaching physiology, don'ts which are sampled in this way by Warren Winthrop, in the American Teacher:—

Don't teach many technical terms. Don't teach many names of bones.
Don't teach many names of muscles. Don't pretend to be a doctor.
Don't play the preacher. Don't be extreme.
Don't trouble yourself about the curiosities of physiology. Don't prove too much by any fact.

THINGS TO DO IN TEACHING PHYSIOLOGY.

Teach facts. Teach only valuable facts.
Make valuable facts interesting.
Teach children to observe physiological facts and phenomena.
Teach children to think about these things.

The Human Body Charts.

While good text-books are an excellent help in the study of physiology it is evident that other aids are necessary, in order to secure the best results. An eye from an ox or sheep, a joint from a chicken or a piece of muscle, bone or cartilage, in the hands of an enthusiastic teacher, are often of far more value to the pupils than a long list of text-book lessons.

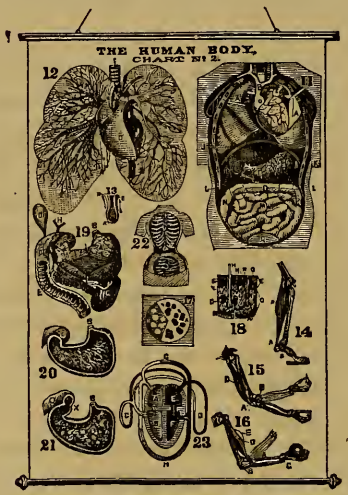
In addition to such means as these many school boards recognize the necessity of placing in every school-room a reliable set of charts illustrating the mechanism of the human body and the effects of intemperance on it. In these charts the multiplication of detail found in the charts made for use in the higher school grades and in surgical works is avoided, as unnecessary in elementary teaching and confusing to the child, while the general facts which should be presented in an ungraded school are treated with great care. In selecting the subjects for the charts those have been omitted which can be illustrated by the teacher from life. The muscles have not been shown in detail, because, being for the most part near the surface, their action can be explained by the real muscles found in the faces and arms of the pupil. For the same reason the external organs, such as the outer parts of the ear, eye, nose, lips, etc., have not been elaborated. Nothing is done with comparative anatomy because samples from the marketman are better than any diagrams and the teacher can easily procure, if she will, a valuable museum of such parts as can be preserved, while the class will willingly provide those that are more perishable, from time to time.

A reference to the accompanying illustrations will show that the Human Body Charts are intended for instruction in anatomy, physiology, hygiene and temperance. A complete hand-book goes with each set, giving not only a description of the several figures, but also many valuable statistics and suggestions relative to the different branches of the subject.

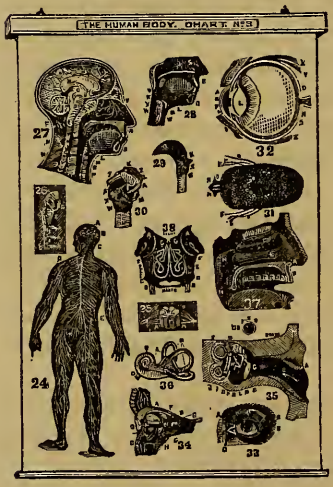
Chart No. 1, contains ten figures, principally devoted to the bones, including a full skeleton thirty-three inches high, detailed drawings of the skull, vertebræ, hand, foot, kneejoint, etc., and carefully studied drawings of the teeth, about double size, and a sectional view of one tooth greatly enlarged.

Chart No. 2, contains fourteen figures, the location and arrangement of the organs of the trunk being indicated in one of them. Another shows very clearly the bronchial tubes and the circulation of the blood, three being devoted to the principal muscles of the arm and the lower part

No. 1.



No. 2.



No. 3.

TEMPERANCE.

of the leg, with their connection with the bones and mechanical action in the movement of the limbs. The relative condition of a healthy stomach and those brought on by stimulents are portrayed in three figures. The baneful effects of tight-lacing are illustrated, and the heart is represented as a double force-pump, with mechanical valves and pipes, through which the blood is shown as flowing, changing from blue to red while traversing

the lungs, and from red to blue while circulating through the upper and lower parts of the body.

Chart No. 3. contains sixteen figures and is chiefly devoted to the nervous system and the five senses, which are illustrated very clearly as being of special interest and value in primary instruction. In this chart are several figures representing the throat, nose and ear, which have been drawn from nature with great care, and illustrate these organs very accurately.

The temperance chart displays four strong portraits illustrating the effects of intemperance on the human face: Temperance Man, Moderate Drinker, Hard Drinker and subject of Delerium Tremens. Four corresponding views of the interior of the stomach supplement the portraits. The healthy and fatty hearts are compared. The fatty liver and hob-nailed liver are shown. Healthy and shriveled blood corpuscles, and sphygmographic tracings of heart-beats indicate the effect of intemperance in the blood and its circulation. Graphic representations of the census returns concerning the relative expenditures for rum and the necessities of life complete an argument for temperance which has never been surpassed for force, truthfulness and artistic effect.

In presenting the subject of physiology to the pupils blackboard and object lessons can be made very valuable. With the younger children the practice of locating the different parts of the body as they are mentioned, whenever practicable, will be found of great assistance. The hand-book can be made to supplement any of the excellent text-books already in use, or in the absence of other books on the subject, may serve as a guide to the charts and an elementary text-book, covering essentially the ground required by the school laws of most states.

CHAPTER XVIII.

PHYSICAL TRAINING.

To argue that gymnastic exercises are not as essential in most ungraded schools as they are in the city graded schools would, perhaps, be an easy task, just as it might be to show that manual training in its various forms, including knife work, and the sewing, cooking, etc., is of less importance to country children as a part of their school course than it is for their city cousins who have so few of those things, even in a modified form, in their homes. But while it may be true that the country boys and girls get plenty of physical exercise out of school it does not follow that the introduction of light gymnastics during school hours will not be a welcome diversion to them, as well as a source of benefit, and the teacher is also likely to find in such exercises a helpful means of discipline.

One of the good signs of the times, remarks the editor of a leading educational journal, is the increasing interest in physical education. And he goes on to say that the same enthusiasm prevailed thirty years ago, and to express the hope that this time it has come to stay. "This everlasting pulling away at the memory and nerves of the child at the expense of his physical structure is wrong, and to prevent it there should be the same systematic training of the body, and under competent instructors, as there is of the mind. The kindergarten is well, and so are the cooking school, and manual training, but these cannot take the place of exercises, carefully and philosophically arranged. Physical education should be directed to the development or drawing out of the physical faculties of the body, just as ordinary literary education is directed to the development of the mental faculties."

Most educators have come to recognize the fact that mind and body are complementary to each other, and that, as co-ordinate parts of a whole, their development should be simultaneous.

The brain is our sole physical organ of thought, and the work which it does is immediately dependent upon the quality and amount of blood which is sent to it by the circulatory system. Since the condition of the blood, moreover, is largely dependent upon its unrestricted flow to all parts of the body and upon its free oxidation, physical exercise becomes an important factor in mental training and is a legitimate and useful part of school work.

It is not possible in this little manual to enter into the physiology or philosophy of movements, but merely to suggest a few that are approved

to teachers who are desirous of making a beginning with their pupils in systematized exercise.

Whenever gymnastics are attempted it is absolutely essential that the clothing of the pupil should, in all cases, be sufficiently loose to admit of free and unimpeded movement. In class work it is impossible to give much special attention to any one pupil, and out of twenty-five or fifty pupils there may be a few, who from individual peculiarity, are unable to profit from some part of the exercises, and these exceptional cases should be carefully noted.

Accuracy should be insisted upon and no new movements undertaken while those already given are carelessly performed, but the exercises should be sufficiently diversified to be entertaining and should never be allowed unduly to tax the mind.

It is well to begin with a few movements for the upper extremities and pass then to the lower extremities. After this, breathing and other exercises for the middle third of the body may be given, returning again to general movement, if desired.

The air in the room must be fresh and pure, while the temperature during exercises should never be over 66° (Fahr.) or under 60°. After exercising the pupils must throw some wrap over the shoulders for a few moments or until the temperature of the room is 70°

A Lesson in Dumb-bell Movements.

We insert here a sample lesson in dumb-bell movements from a little book by Helen Clark Swazey entitled "Suggestions for Gymnastic Exercises in Schools," published by Milton Bradley Co., which runs as follows :—

Position.—Head erect, shoulders square to the front and falling evenly, hips back, trunk erect, heels together, arms at side low ; palms front, grasping bells firmly, the head of the bell pointing in toward the thigh. See Fig. 1.

Fig. 1.

1. Turn the bells half-way round, so that the backs of the hands shall be toward the front. Turn half-way round again, to first position, and continue the movement sixteen times. On the last beat of the measure bring the hands to the hips, as in Fig. 2, ready to change, on the first beat of the next measure make the first forward charge.

For the charge, imagine the foot-mark ⌒ prolonged. Upon this prolonged diagonal line place the right foot at a distance of a foot and a half or two feet from the left foot. Throw the weight on the right foot, bending strongly at the knee and turning the head strongly over the right shoulder, in a line with the right elbow and right knee.

The parts of the charge should be taken simulta-

neously. See Fig. 2. The charge should occupy the same time as the movement, that is, eight accented and eight unaccented beats; on the last beat return to the position of Fig. 1, except that the hands are retained on the hips. This position is held eight beats, or half the time occupied by the charge. On the eighth beat, the arms are thrust quickly to side horizontal, palms up, and held in this position during eight more counts.

2. Turn the bells half-way round, so that the palms are downward. Continue the movement back and forth through sixteen counts, on the last count bringing the arms to the side, and charging as in No. 1, Fig. 2, except that this charge is made to the left and the head turned over the left shoulder.

3. Come back to position as before, and on the last half of the eighth count extend the arms at front horizontal, palms up. Turn the bells as in Nos. 1 and 2, bringing them to the hips on the last half of the sixteenth count, ready for the third forward charge, and on the first beat of the next measure charge, as in Fig. 2, turning the head, however, over the opposite shoulder. Come to position as before, and on the last part of the fourth count bring the arms up to about an angle of 45° from front horizontal, palms facing inward.

4. Hold through eight beats as in the other numbers, and turn bells back and forth as before, placing the hands on the hips ready for the fourth forward charge, which is taken on the last half of the sixteenth count. This charge is like the second forward charge, except that the head is turned over the opposite instead of the same shoulder. Come to position as in the other numbers, dropping the hands to the side low, as in Fig. 1. Hold through eight counts; on the first beat of the next measure bring bells to front horizontal, palms down, striking the bells with the thumb-ends of the bells towards each other,—strike the little-finger-ends of the bells behind the back, Fig. 3. The bells should be struck firmly in front and lightly behind the back. Continue the movement through sixteen counts. On the last half of the last count bring the bells to the chest, the wrists resting against the thorax. The chest should be thrown forward and the shoulders drawn back, Fig. 4.

Fig. 2.

5. From first position of Fig. 4, push the bells down strongly to side

low. Alternate the movement eight times, and take it double eight times. Come to position for charging with the bells at the hips, as in the previous charges.

FIG. 3.

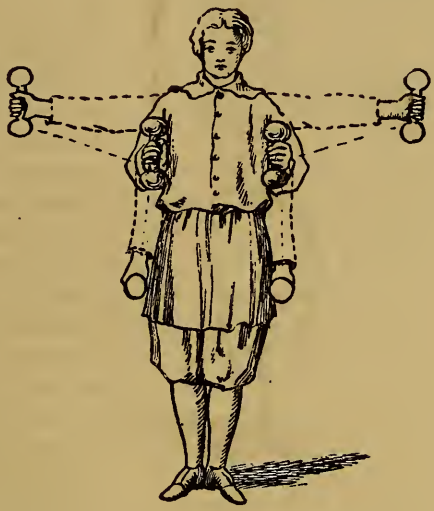


FIG. 4.

FIG. 5.

Imagine a line about two feet back of the right diagonal of a foot-mark, and parallel with it. Upon this line place the right foot. The feet should be at right angles with each other. The weight is thrown on the left leg, which is bent at the knee; the head is turned over the opposite shoulder from the direction of the charge, Fig. 5. Hold the charging position until the last half of the sixteenth count, when the return is made to the first position of Fig. 4.

6. From the first position of Fig. 4, thrust alternately and doubly to side horizontal, as indicated in the same figure, coming to position on the last half of the sixteenth count for the second backward charge, which is the same as the first backward charge, Fig. 5, except that it is made to the right, and the head is turned over the left shoulder. Come to position on the last half of the sixteenth count. Hold through eight counts. Bring the bells to side low. Hold through eight more counts in this position.

7. Strike the bells at the thumb-ends at front horizontal, palms down. Strike behind the back at the little-finger-ends, palms forward. Strike

over head thumb-ends of the bells, palms front. Stop the striking on the fifteenth count, bringing the bells to the first position of Fig. 4, on the sixteenth count.

Fig. 6.

8. Thrust the bells alternately and doubly from the first position of Fig. 4, to front horizontal, coming to position for the third backward charge, which is like the first backward charge, Fig. 5, except that the head is turned toward the same side as that on which the charge is made. Come to first position of Fig. 4, as before.

9. Thrust the bells alternately and doubly to vertical. Keep the elbows stiff and bring the arms close to the ears. Come to position for fourth backward charge. This charge is the same as the second backward charge, except that the head is turned toward the same side as that on which the charge is made.

10. Come to position on the last half of the sixteenth count with the arms parallel in front, the elbows stiff, wrists firm and heads of bells extended up and down. Twist the body to the right and to the left, keeping the feet firmly in position on the floor and the arms parallel, Fig. 6.

Fig. 7.

11. Bring bells to top of shoulders, as in Fig. 7. Thrust up to vertical, as in same figure, rising on the toes as the bells are thrust up. Bring the bells back to the top of shoulders. Stoop, hitting the bells on the floor at the side of the feet. Return bells to shoulder and repeat.

Remark.—The charging positions may be made stronger by increasing the distance of the charge and by bending the charging knee more strongly. In returning to a position after a charge the pressure should be made upon the ball of the charging foot, and the pupil should come back to position with a slight springiness of movement. Heavy movements and dragging the feet should be avoided. For examples of other exercises with dumb-bells, wands and rings, as well as without apparatus, the reader is referred to Miss Swazey's book. A price-list of dumb-bells, wands and rings will be found in the supplement of this manual.

CHAPTER XIX.

CONCERNING THE KINDERGARTEN.

Having referred so many times to the kindergarten in the preceding pages, it may be well to present here a brief summary of the past history and present methods of that system of primary education. The question just how much of this system can be profitably employed in ordinary primary-school work is likely to be a perplexing one for a long time to come, and the answer will always depend cousiderably on circumstances. Meanwhile the wide-awake primary teacher is bound to know what she can about the kindergarten methods and how to use them.

The origin of the kindergarten, a common-sense and eminently practical method of instruction, dates back to the year 1805, when a very peculiar and in many respects very wonderful man—Friedrich Frœbel— was providentially turned aside from a cherished plan of becoming an architect, to the profession of schoolmaster.

Friedrich Wilhelm August Frœbel was born, according to his own statement, "in the Thuringian forest in Oberweissbach, a village of Schwarzburg, April 21, 1782." Soon after 1805 he became acquainted with Pestalozzi, who had already made a great advance in the methods of teaching then practiced. Frœbel was evidently a man of very delicate feelings and not well adapted to fighting his way through the world. It is related of him that at one time he carried a letter from his brother unopened for several days, fearing it contained news that would frustrate some plan he had formed for his future life. When playing with the children under his charge the neighbors used to call him "the old fool." The world would have been benefited by the lives of more such fools.

After the establishment of the kindergarten in Germany the Prussian government forbade its introduction into the public schools, because the royal authorities were keen enough to anticipate that thinking citizens, not willing subjects to tyrannical oppresion, would go forth from them. The founder was hunted from place to place in his own fatherland, simply owing to his too liberal mode of education, and his treatment doubtless hastened his death, which occured June 21, 1852.

Having heard of Frœbels career, Miss Elizabeth Peabody endeavored to work out the principles of the kindergarten in primary teaching in Boston, but utterly failing to obtain results that satisfied her critical judgment, she went to Europe in 1867, to spend a year in close study of Frœbels methods, returning full of the spirit of the work.

Since that time, through the self-sacrificing devotion of Miss Peabody and a goodly number of other enthusiastic and talented educators, the cause has been vigorously advanced throughout the entire country, until the leading advocates of the kindergarten and former associates of Frœbel in Europe are looking with great interest to America as the most promising field for the rapid advancement of this grand movement.

Frœbel at first had the idea most prominent in his mind of introducing his new education into families through the mothers, but that was soon seen to be impracticable, for two reasons. First, the mother could not devote the necessary time to the subject, and, secondly, by such an arrangement half the value of the method would be lost, as a real kindergarten is a perfect little democracy where the social relations are as valuable as any other part of the instruction.

"Kindergarten," in its literal translation, means "children-garden," and this name was given it as a place where the growth of the bodies and minds of the little ones is to be carefully developed, as the floral offspring of beautiful nature are nursed and lovingly fostered by the experienced florist in a flower-garden. In its application the kindergarten intends to be a practical solution of the momentous question, "What kind of treatment is conformable to a child's bodily and mental development during the socond and third biennium of his life?"

From the moment when the child brings one motion in relation to another—asserting that a thing is, how a thing is, and that a thing does something—the mind commences its operations; the child begins to think. No sooner has this event taken place—the first in the mental life of the individual—than the child instinctively shows his desire to enlarge his treasure of knowledge. Hence his innumerable questions. "What is? how is? and what does this or that do?" And happy the child whose questions are answered logically, always encouragingly, but in accordance with his power of comprehension. The interchange of thoughts is the best exercise for strengthening his perceptive and conceptive faculties, and by it only can be laid the foundation for a sound and sharp reasoning.

The question, "How can this be done most successfully?" has been answered with perfect satisfaction by the "kindergarten," which, far from being a "school" in the usual sense of the word, is nothing but the common nursery of several families, who have united for the purpose of having their little ones occupied during a part of the day, under the superintendence of a person who has made this branch of education a special study. Unfolding of bodily and mental powers, creating and enlivening æsthetic feeling, inculcating moral principles by example and precept, and strengthening the desire for activity, knowledge and perfection, are its tasks; in short, harmonious development of true, pure human nature is the praiseworthy aim of the kindergarten.

A List of the Kindergarten Material.

We give below a descriptive list of all the material which is generally accepted as belonging to the kindergarten, comprising that originally devised and adopted by Frœbel and such additions as have since been approved by the leading kindergartners of Europe and America. There are at present twenty divisions of this material, know as gifts and occupations. The first nine and the fifteenth, sixteenth and seventeenth are called gifts alone, the others being termed gifts or occupations.

According to Prof. Hailmann, "The gifts are intended to give the child from time to time universal aspects of the external world, suited to his powers of comprehension. The occupations, on the other hand, furnish the child with materials on which to exercise certain phases of skill."

First Gift.—Six soft balls of various colors—aim to teach color—right and left—to develop the eye, movement of hands, arms and feet in various plays.

Second Gift.—Sphere, cube and cylinder, made of wood. Aim to teach form, to notice similarity and dissimalarity of objects; sides, corners and edges of cube explained and counted; qualities and actions of sphere, cube, and cylinder different, owing to their difference in shape. Sphere viewed from all sides looks alike; but cube and cylinder present different forms, according to the manner in which we look at them.

Third Gift.—Large cube, consisting of eight small cubes.

Fourth Gift.—Large cube, consisting of eight oblong blocks.

Fifth Gift.—Large cube, consisting of twenty-one whole, six half, and twelve quarter-cubes.

Sixth Gift.—Large cube, consisting of eighteen whole, and three lengthwise and breadthwise divided, oblong blocks.

These four gifts serve as building blocks, and for this purpose—one of the most perfect, interesting, and developing features of the kindergarten—there are an endless variety of plans to be carried out, one surpassing the other in interest and beauty.

Seventh Gift.—Quadrangular and triangular tablets of wood for laying figures. In the occupation with these tablets, as also in that with the material of the previous four gifts, the law of opposities, and their mediation and combination, is constantly followed. In the six previous gifts the child has to do with solids; with the tablets comes the use of the planes, which are followed by the introduction of the embodied straight line in the eighth gift, and the curved line in the ninth gift.

Eighth Gift.—Consists of staffs or wands for laying figures.

Ninth Gift.—Consists of whole and half wire rings, also for laying figures.

The staffs and rings are used as preparatory to the drawing occupations. The former are also employed, as are most of the previous gifts, for the purpose of teaching numerical proportions. That which is usually called

the multiplication table is taught by means of these gifts, by actual observation.

Tenth Gift.—Material for drawing, consisting of slate and sheets of paper ruled in various ways, and pencils of different colors.

Eleventh Gift.—Material for perforating.

Twelfth Gift.—Material for embroidering.

For these two occupations lithographed paper is prepared, and with a perforating needle the pupils pierce the representations in it, to which they subsequently give the natural colors of the objects, by employing worsted or silk. Starting from a straight line of one-eighth of an inch, they produce, in course of time, the most beautiful representations of natural and artificial objects—mute, eloquent tokens of an early-acquired taste in regard to form and color, and of manual dexterity and skill rarely witnessed in children of such tender age.

Thirteenth Gift.—Cutting of paper, and combining the parts so produced into figures. Squares of paper are folded in different ways, and are cut, according to marks on them, by the pupils. The child's propensity to use scissors, and to destroy by doing it, is here guided in such an ingenious manner that the most astonishing results are secured.

Fourteenth Gift.—Material for weaving or braiding.

Strips of colored paper, are, by means of a steel needle of peculiar construction, woven into a differently colored sheet of paper, which is cut into strips throughout its entire surface, except a margin at each end to confine the strips in place. The greatest variety of designs are produced, and the inventive powers of teacher and pupil constantly increase their number.

Fifteenth Gift.—Slats for interlacing.

Sixteenth Gift.—Jointed slat with four, six, eight, and sixteen links.

The slats of the fifteenth gift—ten inches long and one-fourth inch broad—are used to construct objects by interlacing them. The jointed slat with several links is used to produce various forms, by changing the direction of the links.

Seventeenth Gift.—Paper strips for lacing.

Paper strips of various colors—eight or ten inches long, and folded lengthwise—are used to represent a variety of fanciful forms, by bending and twisting them according to certain rules.

Eighteenth Gift.—Material for paper folding.

Square pieces of paper are here used to form variously shaped objects by folding. The variety is endless, and the work prepares the pupil for many a useful and similar manual performance in practical life.

Nineteenth Gift.—Material for Peas-work.

Pointed wires or sticks are joined at the ends by soaked peas, bits of cork or bees-wax, forming outline models or frames representing the various solid forms.

Twentieth Gift.—Material for modeling.

Moist clay is used to form various shapes representing geometric solids, or objects of life. Clay modeling is now recognized as the first step in art education, preceding drawing, and it has for many years been prominent in the kindergarten as one of the most useful occupations, covering the entire course of instruction.

The careful observer will perceive, in perusing the above list of occupation material, how systematically it is arranged, and how successfully, through the whole series of gifts the two leading ideas have been combined, to amuse and instruct at the same time. For a more detailed description of the kindergarten material the reader is advised to send for the kindergarten catalogue of Milton Bradley Co.

We must admire the inventive genius of the great originator of this system, in preparing all these means of education—excellent as they are simple; affording, as it were, an inexhaustible treasure of elementary ideas of human nature, and, in the mean time, holding up before our eyes the beautiful aim to develop the child during the period of his mind's awakening for the future man, and to endow him with the two most reliable safeguards of happiness on his journey through life—love for occupation and a desire to imitate and cultivate all that is good, true, noble, useful and beautiful.

For a list of books giving instruction in kindergarten methods and desirable for use in directing the kindergarten songs and games the teacher is referred to the concluding pages of this book.

PRICE-LIST OF

EDUCATIONAL MATERIAL

Manufactured by

MILTON BRADLEY COMPANY,

ARRANGED IN THE SAME ORDER AS IN THIS BOOK.

A * indicates that the article cannot be sent by mail.

CHAPTER I.

	Price.	Postage.
Sentence Builder, per box,	$0.14	free
Word Builder, per box,	.12	free
Word Making Tablets, per box,	.25	free
Language Tablets, per box,	.35	free

CHAPTER II.

Geometrical surfaces and solids, per box,	2.00	$0.40
Bailey's development of surfaces, per set,	.25	.07

CHAPTER III.

Best refined clay, brick 5 pounds,	*.25	
Praraffine, brick 4x4x8 in.	*.75	
" " 2x4x8 "	*.40	
" " 2x4x4 "	*.20	
Dozen modeling knives,	.25	.02
Squared enameled cloth, per yard,	1.00	.30

CHAPTER IV.

THE INCH CUBES.

1000 assorted colored cubes, in bulk,	*5.50	
1000 plain cubes, in bulk,	*4.50	
100 colored cubes, in paper box,	.60	.30
100 plain cubes, in paper box,	.50	.30
27 colored cubes, in paper box,	.18	.10
Small box, 36 of Mrs. Hailmann's beads,	.12	.02
Beads, per gross,	.40	.05
Beads, per 1000,	2.00	.30

EACH PACKAGE OF COATED PAPERS CONTAINS 1000 PIECES.

Circles, 1 inch in diameter, assorted colors,	.18	.02
" 1 " " " six col's and tints, grays and black,	.18	.02
" 1 " " " six colors,	.18	.02
Squares, 1 inch, six colors and tints, grays and black,	.18	.02
" 1 inch, assorted colors and shades,	.18	.02
" 1 inch, six colors,	.18	.02

Owing to the methods of manufacture it is IMPOSSIBLE for us to furnish these papers in any other colors or assortment of colors from those indicated.

PLAIN STRAWS.

100 straws, 10 inches long,	.10	.05
1000 straws ¾ inches long, in a box,	.25	.05
1000 straws 1 inch long, in a box,	.30	.06

COLORED STRAWS.

100 straws, 10 inches long, in six colors,	.15	.05
1000 straws, ¾ inches long, in a box,	.35	.05
1000 straws, 1 inch long, in a box,	.45	.06

PEGS AND PEG-BOARDS.

1000 round pegs, in paper box,	.20	.04

	Price.	Postage.
1000 large square pegs, in paper box,	$0.15	$0.09
3000 small square pegs, per box,	.15	.11
1 dozen boards,	*1.75	

DRAWING STENCILS.

No 1 stencils, per box,	.25	.08
No 2 stencils, per box,	.25	.08

CHAPTER V.

COLOR TABLETS AND GELATINE FILMS.

1 box, with complete outfit,	1.00	.20
1 set of gelatine films, in envelope,	.10	.01
12 sets of 2-inch color tablets, in box,	.25	.09
1 set 4-inch tablets, in envelope,	.10	.03
Colored pencils, 7 inches long, each,	.06	.01
Colored pencils 4½ inches long, each,	.02	.01
Colored pencils, 4½ inches long, assorted, 6 in a box,	.10	.02
Colored slate pencils in wood, three colors each,	.05	.02

For a more detailed description of this material send for catalogue of School Aids and Material.

CHAPTER VI.

COLORED STICKS.

1000 sticks, 5 inches,	.35	.11
1000 " 4 "	.30	.09
1000 " 3 "	.25	.07
1000 " 2 "	.20	.05
1000 " 1 "	.15	.03
1000 " 1 to 5 inches, assorted, in paper box,	.25	.08
1500 " 1 to 5 inches, assorted in wooden box,	.60	.22

The wooden box containing fifteen hundred assorted sticks, is finely polished and has five compartments, but cannot be mailed without injury to the contents.

PLAIN DIAGONAL STICKS.

1000 sticks, 5 inches square,	.25	.15
1000 " 4 " "	.20	.12
1000 " 3 " "	.15	.09
1000 " 2 " "	.12	.06
1000 " 1 " "	.08	.03
1500 " 1 to 5 inches square, assorted, in wooden box,	.40	.22

CHAPTER VII.

100 primary pricked sewing cards, with box,	.50	.15
1 dozen envelopes of embroidery design cards, 14 in each,	1.75	.25
1 " spools of cotton, assorted colors	.60	.10
1 " pricking needles in handle,	.35	.02
1 " felt cushions for perforating,	.50	.25

COOLEY'S WRITING EMBROIDERY CARDS.

1 school box, 50 cards of one letter,	.40	free
1 family box, 25 assorted cards of our own selection,	.30	free
1 dozen cards, selected by the buyer,	.12	free

CHAPTER VIII.

50 of Mrs. Hailmann's mats and fringes, engine colored papers,	.25	.04
25 mats and fringes, coated papers, Z—10 only,	.15	.02
1 dozen Ball weaving needles,	.60	.03
1 dozen Bradley weaving needles,	.50	.03
1 dozen Improved weaving needles,	.45	.02

For the detailed list of material used for weaving mats of different sizes, the reader is referred to our Kindergarten catalogue.

CHAPTER IX.

PAPERS FOR FOLDING.

100 squares, 4x4, engine colored,	.12	.04
100 equilateral triangles, 4 inches on side, engine colored,	.20	.03

	Price.	Postage.
100 circles, 4 inches diameter, engine colored,	$0.20	$0.03
100 pieces, squares, 4x4, coated paper,	.20	.04
400 equilateral triangles, 4x4, coated paper,	.25	.03
100 circles, 4 inches diameter, coated paper,	.25	.03

CHAPTER XI.

100 sheets practice drawing paper,	.15	.06
Primary drawing tablets, per set,	.25	free
Springfield support for drawing-models, each,	*.25	
1 dozen school rule,	.25	.08
1 dozen mechanic's scale,	.10	.04
1 gross mechanic's scale,	.*.75	
1 dozen international rule,	.10	.04
1 gross international rule,	*.75	

THE SPRINGFIELD INDUSTRIAL DRAWING KIT.

Kit No. 1, sample set, without pad,	.35	free
Kit No. 1, sample set, ordinary pad,	.50	free
Kit No. 1, sample set, extra-quality pad,	.55	free
Kit No. 2, sample set, without pad, (not mailable),	*.50	
No. 1, blackboard compasses, each,	*1.00	
No. 2, blackboard compasses, "	*.50	
"Matchless" pencil compasses, "	.25	.02
Beam compasses, "	*.25	
Graduated yard-stick, "	*.10	
Springfield pantagraph, "	.50	.05

CHAPTER XII.

KENDALL'S CHROMATIC NUMERAL FRAME.

No. 1, 12 wires, turned lower bar, each,	*.75	
No. 2, 10 wires, turned lower bar, "	*65	
No. 3, 12 wires, square frame, "	*.65	
Large pegs for counters, per box,	.15	.09
Primary counting blocks, per box,	*1.25	

PARISH'S PRIMARY NUMBER TABLETS.

Set A, wooden tablets, per box,	.20	.06
Set B, wooden tablets, per box,	.25	.09
Set A, card-board tablets, per envelope,	.12	free
Set B, card-board tablets, per envelope,	.15	free

DU SHANE'S FIGURE CARDS.

1 sample box,	.25	free
12 boxes,	*2.50	
Number builder per box,	.12	free
Reed's card-board objects, per dozen sheets,	.12	.05

CHAPTER XIII.

THE EDUCATIONAL CLOCK DIALS.

12-inch dial, cloth-bound and varnished, each,	.50	.20
12-inch dial, on thick card, each,	.25	.12
4½-inch dial, on thick card, each	.12	.02
4½-inch dial, per dozen,	1.25	.16
Sample box, educational toy money,	.25	free
For a detailed list of prices for the money when sold in bulk send for a catalogue of School Aids and Material.		
"Buying and selling" per box,	.50	free

CHAPTER XIV.

Teachers' fraction discs, per set,	.30	.06
Pupils' fraction discs, per set,	.12	free

CHAPTER XV.

Cabinet of weights and measures.	*10.00	
Cubical leter measure,	*.60	
Set of metric weights,	*1.50	

	Price.	Postage.
Apparatus illustrating area of circle, per set,	$1.25	$0.15
Areas of two triangles, per set,	1.15	.15
Two triangles and the circle sectors,	2.50	.25
Contents of cone, sphere and cylinder, per set,	.75	.20
No. 1 cube root blocks, to one place, per box,	.60	.10
No. 2 cube root blocks, to two places per box,	.80	.10

CHAPTER XVI.

DISSECTED MAPS.

Europe, size, 12x9	*.75	
Asia, size, 21½x20½	*1.25	
Africa, size, 17x18½	*1.25	
North American, size, 18x20	*1.25	
South American, size, 15x19,	*1.25	
Set of five maps,	*5.00	
United States, in states-wood, each	*1.00	
United States, paper-board, each,	.50	.20
Puzzle map, United States, in paper box,	.25	.06
Puzzle map, North America, in paper box,	.15	.02

CHAPTER XVII

THE HUMAN BODY CHARTS.

Full set of 4 charts, in No. 1 style	4.00	.45
Full set of 4 charts, in No. 2 style,	4.00	.45
Full set No. 3 style (spring-roller cases),	*6.75	
Set of three charts, without Special Temperance chart, in No. 1 or No. 2 style,	3.00	.35
Set of three charts, in No. 3 style, (spring-roller cases),	*5.00	
Special Temperance chart in No. 2 style,	1.50	.15
Special Temperance chart, in No. 3 style ,.	*2.00	

CHAPTER XVIII.

DUMB-BELLS.

No.	Length outside of Balls.	Diameter of Balls.	Estimated weight of each Piece.	Price, per Pair.
2	7 in.	2 in.	3 oz.	$0.20
4	8 in.	2½ in.	7 oz.	30
5	8¾ in.	2¾ in.	10 oz.	35
6	9½ in.	3 in.	12 oz.	40
7	9¾ in.	3¼ in.	15 oz.	45

The postage on the dum-bells is a cent on ounce.

CHAPTER XIX.

For a price-list of all Kindergarten material see Kindergarten catalogue.

BOOKS FOR TEACHERS.

ALL THESE BOOKS WILL BE MAILED FOR THE PRICES QUOTED.

PARADISE OF CHILDHOOD.

By Edward Wiebe. Revised Edition.—This standard work was the first illustrated guide to the Kindergarten ever published in the English language, and is still the only complete guide covering the whole ground. It is an exponent of pure Frœbelian Kindergartning, and forms the best possible foundation for the building of a complete Kindergarten education. No book can take the place of practical observation and experience, but the PARADISE OF CHILDHOOD is very valuable to any parent or teacher who desires to look into this popular method of child-culture. Some years since we published A HAND BOOK FOR THE KINDERGARTEN, which consisted of the illustrations from PARADISE OF CHILDHOOD, prefaced with brief text by the ladies of the Florence, Mass., Kindergarten. This work was highly recommended by Miss E. P. Peabody, and sold for $1.00.

The growing interest in the Kindergarten methods has increased the demand for the more detailed manual to such an extent that the call for the Hand Book is too limited to warrant its continued publication, but in order to preserve the valuable chapters which it contains, they have been added to the revised edition of the PARADISE OF CHILDHOOD, without any increase in price, so that this standard and complete work now contains, in addition to the original text, a paper on Kindergarten Culture, added some years since, and the text of the Hand Book, making altogether one hundred pages of text and seventy-six pages of lithographic plates, at a price which brings it within the reach of every teacher and parent. One volume, 4to. Price, paper covers, $1.50; cloth, $2.00

THE KINDERGARTEN AND THE SCHOOL.

By Four Active Workers.—The book comprises five papers as follows: Frœbel—The Man and His Work, *by Anne L. Page;* The Theory of Frœbel's Kindergarten System, *by Angeline Brooks;* The Gifts and Occupations of the Kindergarten, *by Angeline Brooks;* The Use of Kindergarten Material in the Primary School, *by Mrs. A. H. Putnam;* The connection of the Kindergarten with the School, *by Mrs. Mary H. Peabody.* Well printed on heavy paper, with wood engravings illustrating the chapter on the gifts and occupations of the Kindergarten. 150 pages. Price, paper covers, $0.50; cloth, $0.75

SONGS, GAMES AND RHYMES,

FOR THE NURSERY, KINDERGARTEN AND PRIMARY SCHOOL.

With notes and suggestions, *by Eudora Lucas Hailmann.* In the preface the author says: "To parents, kindergartners and primary teachers these songs and games are presented with the hope that they will in some measure satisfy the demand for a wholesome, elevated kind of music, and for words suited to the thoughts and feelings of very young children.

The cultivation of the music sense should begin in earliest childhood, but like all beginnings the task is both difficult and delicate. If it be neglected during the first few years it is scarcely possible to re-arouse it. To meet this need in earliest infancy is the justification for the hand and finger games contained in this book."

The book contains 211 pieces, classified as follows: Opening Songs, 15; Closing Songs, 10; Songs and Games of the Seasons, 16; Weather Songs and Games, 10; Songs and Games of Animated Nature, 35; Trades and Occupations, 19; Marches and Movement Plays, 31; Ball Games, 20; Finger and Hand Games, 26; Miscellaneous Games, 30. 169 pages. Price, paper covers, $1.25; cloth, $1.75

SONGS FOR LITTLE CHILDREN.

A collection of Songs and Games for Kindergarten and Primary Schools. Part 1. Composed and arranged by *Eleanor Smith*, with preface by *Mrs. Alice Putnam*.

The following are the closing sentences of Mrs. Putnam's preface:—"This book is sent out in the hope that it may lead kindergartners and primary teachers to look more carefully *everywhere* for the right means to develop a right musical feeling in children. Many kindergartners in Chicago feel gratefully the good results of their lessons with Miss Smith, and we hope others of our 'guild' may find the same pleasure which we have had in these songs."

Prof. W. L. Tomlins, of Chicago, says: " 'SONGS FOR LITTLE CHILDREN' will meet a long-felt want in the kindergartens. It is an admirable book, and will undoubtedly attain the success it deserves."

Miss Betsy Harrison, president of the Chicago Kindergarten Club, says: "We Chicago kindergartners feel that Miss Smith has presented a gift to the children of our nation well worth our thanks."

This book contains 84 pieces, divided as follows: Morning Songs, 7; Songs of the Seasons, 26; Gift Songs, 27; Marching Songs, 5; Circle Games, 5; Trade Songs, 4; Miscellaneous, 17; Closing Songs, 3. 109 pages.

Price, paper, $0.90; cloth, $1.25

A KINDERGARTNER'S MANUAL OF DRAWING.

By N. Moore.

There is at present a general and renewed interest in the subject of drawing in the kindergarten, and Miss Moore, having advanced with all other progressive teachers in this line, has almost entirely rewritten the text of her book. It now stands foremost in advocating reforms in the Kindergarten drawing, and should be in the hands of every kindergartner, as many of them feel that their methods in drawing are not up to the advanced demands of the present day.

The new edition contains 18 large 4to pages of text and 17 full-page lithographic plates, comprising a total of 337 separate figures and exercises One volume, large 4to. Price, paper $0.50

SUGGESTIONS FOR GYMNASTIC EXERCISES FOR SCHOOLS.

By Hellen Clark Swazey.

"It is not a soul, it is not a body that we are training up; it is a man, and we ought not to divide him into two parts."—MONTAIGNE.

This brief manual is designed to furnish the teacher with such information as will insure the safe and healthful introduction of physical training in the lower grades of our public schools.

Miss Swazey's education and experience in anatomy, physiology and light gymnastics peculiarly fit her to give the advice and instruction needed by every teacher. The MOVEMENTS and the use of WOODEN DUMB-BELLS, WANDS and RINGS are very clearly explained and fully illustrated by drawings from life.

Price, in paper covers, $0.15

KINDERGARTEN AND CHILD-CULTURE PAPERS.—Papers on Frœbel's Kindergarten, with suggestions on principles and methods of child-culture in different countries, revised edition, published from the American Journal of Education.—*Henry Barnard, LL. D., Editor.*

This work gives a full account of Friedrich August Frœbel, and the Kindergarten as developed by him and his immediate associates and pupils, and the Principles and Practices of Child-culture by eminent educators. The book covers the whole subject of which it treats more thoroughly than any other book ever published, and, although somewhat expensive, is a profitable investment for any Primary-school teacher. A complete Cyclopedia of the Kindergarten. 800 pages. Price, cloth, $3.50

PRIMARY METHODS.—A complete and methodical presentation of the use of the Kindergarten Material in the work of the Primary School, unfolding a Systematic Course of Manual Training, in connection with Arithmetic, Geometry, Drawing and other school duties.—*By W. N. Hailmann, A. M.*, Superintendent Public Schools, La Porte, Ind.

A valuable treatise upon the GIFTS and OCCUPATIONS employed in the Kindergarten. The book contains MODEL LESSONS explaining every detail entering into the proper employment of children in "busy work," Counting, Addition and Subtraction, Multiplication and Division, Folding (Square and Circular), Modeling (Plastic Clay), Cutting and Mounting, Card-board Work, Fraction Strips, Splits or Sticks, Sticks and Peas, Lentils or Dots, The Group Table.

Each of the chapters is a complete guide to the teacher, for the special kind of work treated, and the book cannot fail to give satisfaction to those who essay to accomplish good results in this important department of school work.

The "new departure of the age"—MANUAL TRAINING SCHOOL—requires for the guidance of its followers, in the early grades, just such a book as "PRIMARY METHODS."

Professor Hailmann's close association with the interests of the Kindergarten System, as editor for many years of the "Kindergarten Messenger," have made him the right man to undertake to guide others in the work, and the "new departure" could not receive more substantial assistance than is given in this book. 166 pp., ... Price, cloth, $0.75

MERRY SONGS AND GAMES for the use of the Kindergarten, selected and compiled by *Clara Beeson Hubbard.* Large 4to, full cloth and gilt. Price, $2.00

KINDERGARTEN CHIMES.—A collection of songs and games composed and arranged for Kindergartens and Primary Schools, by *Kate Douglass Wiggin*, (California Kindergarten Training School, San Francisco). A handsome book of 110 pages of songs for little children, with simple piano accompaniments to all the pieces, ... Price, boards, $1.00; cloth, $1.50

NATIONAL KINDERGARTEN SONGS AND PLAYS.—*By Mrs. Louise Pollock*, Principal of Kindergarten Normal Institute, Washington, D. C. One volume, 12mo.
Price, boards, $0.50

CHEERFUL ECHOES.—From the National Kindergarten, for children from three to ten years of age. Written and compiled by *Mrs. Louise Pollock.* One volume, 12 mo. 72 pages.

The book is divided into Opening and Closing Songs; Marching and Ring Songs; Gymnastic Plays; Ball Games; Songs of Nature; Trades; Miscellaneous.

The collection contains many gems in words and music. Price, boards, $0.50

MOTHER-PLAY AND NURSERY SONGS.—*by Friedrich Froebel.* Fifty engravings with notes to mothers, and music for songs. One volume, large 4to, bound.
Price, cloth, $2.00

REMINISCENCES OF FRIEDRICH FRŒBEL.—*By Baroness B. Von Marenholtz-Bulow*, with a sketch of the life of Frœbel by Emily Shirreff, 16 mo. Price, cloth, $1.50

KINDERGARTEN CULTURE IN THE FAMILY AND KINDERGARTEN.—*By W. N. Hailmann.* A complete sketch of Froebel's system of early education, adapted to American institutions. For the ues of mothers and teachers. Illustrated.
Price, cloth, $0.75

THE USE OF STORIES IN THE KINDERGARTEN.—*By Miss Anna Buckland.*
Price, paper, $0.15

RHYMES AND TALES FOR THE KINDERGARTEN AND NURSERY.—Collected and revised by *Alma L. Kriege*, with introductory remarks on the value and .mode of telling stories to children. . . . . Price, cloth, gilt edges, $1.00

SONGS FOR LITTLE FOLKS IN THE HOME AND IN THE SCHOOL.—*By Mrs. W. F. Crafts and Miss Jennie B. Merrill.* . . . . . Price, boards, $0.35

LITTLE PILGRIM SONGS.—For primary classes and singing in the home. A new collection of sacred and secular songs (including motion songs), together with a number of services for anniversary occasions. *Arranged byMrs. W. F. Crafts and Hubert P. Main.* . . . . . Price, boards, $0.35

135 KINDERGARTEN SONGS AND GAMES.—*By Mrs. Edward Berry and Madame Michaelis.* . . . . . Price, cloth, $0.75

MUSIC FOR THE KINDERGARTEN, HYMNS, SONGS, AND GAMES.—Collected and arranged by *Elenore Heerwart.* . . . . . Price, flexible cloth, $1.25

PLAYS AND SONGS FOR KINDERGARTEN AND FAMILY.—Collected and arranged by a Kindergartner. . . . . Price, paper, $0.50

PLAYS FOR THE KINDERGARTEN.—*By Henrietta Noa.* Music by Ch. J. Richter. Price, paper, $0.30

SONGS, MUSIC AND MOVEMENT PLAYS OF THE KINDERGARTEN.—*By Edward Wiebe.* Quarto, 64 pages of music. . . . . Price, paper, $2.25

THE LITTLE DIADEM, OR LITTLE SONGS FOR LITTLE SINGERS.—72 pages. Price, flexible covers, $0.25

THE KINDERGARTEN GUIDE.—*By Maria Kraus-Boelte and John Kraus.* An illustrated Hand-book designed for the self-instruction of Kindergartners, mothers, and nurses. Seven parts are now published, and others will be furnished when issued.

1. *The First and Second Gifts.* With 50 illustrations. Price, paper, $0.35; cloth, $0.65

2. *The Third, Fourth, Fifth, and Sixth Gifts.* With 497 illustrations. Price, paper, $0.70; cloth, $1.00

3. *The Seventh Gift* (*The Tablets*). With 554 illustrations. Price, paper, $0.50; cloth, $0.80

4. *The Eighth Gift* (*The Connected Slat*). *The Ninth Gift* (*Slat-Interlacing*). *The Tenth Gift* (*Stick-laying*). With 509 illustrations. Price, paper, $0.70; cloth, $1.00

5. *The Eleventh Gift* (*Ring-laying*). *The Twelfth Gift* (*The Thread Game*). *The Thirteenth Gift* (*The Point*). With 468 illustrations. Price, paper, $0.70; cloth, $1.00

These five numbers can be ordered bound together in one volume. Price, by mail, paper covers, $2.00; cloth covers, $2.75

6. *The First Occupation* (*Perforating*). *The Second Occupation* (*Sewing-out*). With 204 illustrations. Price, paper, $0.50; cloth, $0.80

7. *The Third Occupation* (*Drawing*). With 351 illustrations. *The Fourth Occupation* (*Coloring and Painting*). With 83 chromo lithographed illustrations on 12 plates. Price, paper, $1.00; cloth, $1.30

BOOKS IN PREPARATION.

COLOR IN THE SCHOOL-ROOM.

This work treats of the necessity of Teaching Color in the Primary Schools, Color Blindness, The Theory of Light, What is Meant by the Solar Spectrum, How to Utilize the Spectrum as a Standard of Color, The Use of the Rotating Disks, How to Make the Spectrum Standards Practical, The Necessity of a Color Nomenclature, The Proper Combinations of Colors, How to Teach Color in the School-Room with Colored Papers and Water Colors.

It is believed that this book will be found both practical and scientific by the great number of teachers who feel that color-teaching is one of the educational demands of the times, but who keenly appreciate the difficulties attending such instruction. "Color In the School-Room" tells what material is needed for this sort of work and how to use it, a number of perplexing questions regarding the science of color being, meanwhile, handled intelligently and helpfully.

KNIFE WORK IN THE SCHOOL-ROOM.

A treatise outlining a course of manual training for the upper grammar grades which can be conducted in the school-room itself by the ordinary teacher, with the simplest tools and at small cost. This book is written by the principal of the Springfield, Mass., manual training school and is liberally illustrated.

It is safe to assert that nothing beginning to be as practical as "Knife Work In the School-Room" has yet been written on the subject of manual training. The teacher who buys the book and follows its directions will know just what to do in his or her school-room. It has an introduction setting forth the principles on which correct manual training in the public schools rests.

PAPER FOLDING AND CUTTING.

A manual of work in these occupations for primary grades, by two well-known supervisors of drawing.

MILTON BRADLEY CO.,

Springfield, Mass.

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